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DR. JOHN MORGAN.

(Reproduced from "The History of Medicine in the United States."
By Dr. Francis R. Packard.)

THE AMERICAN
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JANUARY, 1904.

JOHN MORGAN,

THE FOUNDER OF THE FIRST MEDICAL SCHOOL AND THE ORIGINATOR OF PHARMACY IN AMERICA.

By M. I. Wilbert,
Apothecary at the German Hospital, Philadelphia, Pa.

John Morgan, by far the most erudite and in many respects the most noble and interesting character in colonial medicine, contributed more than any one other individual to establish and to promote medical teaching, medical ethics and medical progress in America.

A simple enumeration of some of his claims to priority will bring to mind the nature and variety of his accomplishments. He was the founder of medical training, and was elected the first professor of medicine in a recognized chartered college. He was one of the founders of the first medical society in Philadelphia.

He was one of the founders of the American Philosophical Society. He was one of the founders of the College of Physicians of Philadelphia, was the first to suggest the necessity or use of such an institution, and among the first to donate books with a view of creating a library.

What is perhaps of more interest to us as pharmacists, however, is the fact that Dr. Morgan was the first, and for many years the only, practitioner in America to suggest and follow the practice of writing prescriptions, and having his medicines dispensed by a qualified apothecary.

To more thoroughly appreciate the untoward conditions under which Dr. Morgan attempted to introduce this latter, and, at the time, unpopular innovation, we must take a short retrospect of the conditions as they existed in the early half of the eighteenth century, when Morgan first entered as a medical apprentice. The active, outdoor life of the early colonists made them an exasperatingly healthy class of people, but even when ill the advice of a physician was only sought after the whole gamut of household remedies had been tried and failed. Physicians were not numerous, and druggists were few indeed.

Watson, in his "Annals of Philadelphia," mentions but six drug stores existing in Philadelphia about 1750, the few that were not owned by physicians were devoted exclusively to supplying medicines and medicinal preparations to physicians, and to the sale of such household remedies as the housewife could not gather herself in the fields or cultivate in her own garden.

Physicians invariably dispensed their own medicines, and these were usually prepared by the apprentice or apprentices of that day. These apprentices, by running errands, gathering herbs, preparing and dispensing medicines and attending to other and at times even menial duties about the house of their master, were expected, in the course of the six or seven years of their apprenticeship, to absorb sufficient knowledge of physic to open a shop and practice for themselves.

Dr. Francis R. Packard, in his "History of Medicine in the United States," refers to the life of these early medical apprentices, and quotes from the life of Dr. John Bard, one of the more famous of the colonial medical men, who in speaking of his preceptor says: "He treated his pupils with great rigor and subjected them to the most menial employments."

It was into conditions such as these that John Morgan was born in 1735. His father, Evan Morgan, was a native of Wales and came to Philadelphia at an early date, where he engaged in mercantile pursuits, and is said to have been quite successful.

From letters written by Benjamin Franklin it appears that Evan Morgan was a friend and close neighbor of that celebrated printer, philosopher and statesman.

John Morgan, when still quite a lad, was placed at Nottingham School, Chester County. This school, at that time, was under the

direction of a Rev. Mr. Finley, and had a high reputation throughout the middle colonies for its thorough instruction in Latin and Greek.

After the founding of the College of Philadelphia, Morgan was transferred to the latter institution, and about the same time was apprenticed to Dr. John Redman, one of the most successful as well as one of the most popular of the early physicians of Philadelphia.

In this double capacity of student and apprentice Morgan continued until 1757, when he graduated from the College of Philadelphia, being one of the class of seven, the first to receive a collegiate degree in Philadelphia.

It was during this same period of his apprenticeship that John Morgan served as apothecary to the Pennsylvania Hospital. Dr. Redman, his preceptor, was at that time one of the physicians to the hospital, and it was at his suggestion that Morgan was appointed to fill the vacancy that had occurred on the resignation of Jonathan Roberts, the first apothecary.

After serving thirteen months as apothecary in the hospital, Morgan resigned, May 1, 1756, and was succeeded by John Bond, a nephew of Dr. Thomas Bond, another one of the physicians and also one of the founders of the Pennsylvania Hospital.

After graduating from the College of Philadelphia and completing his term of apprenticeship with Dr. Redman, Morgan enlisted as lieutenant and surgeon, with the provincial troops in their campaign during the French War.

From his own statements, as well as from contemporary reports, it appears that it was in the capacity of surgeon that Morgan was chiefly engaged. His fellow-apprentice, lifelong friend and biographer, Dr. Benjamin Rush, in speaking of this period, lauds Morgan very highly for his diligence and humanity in attending the sick and wounded, and intimates that Morgan, even at that time, possessed considerable skill as a physician and surgeon.

Morgan left the army in 1760, and on the advice of his former preceptor and other friends, went to Europe to perfect himself in his profession.

Through the personal friendship of Benjamin Franklin, then a resident in London as the agent for the Province of Pennsylvania, he was introduced to a number of the prominent medical men and scientists in the English metropolis. He thus had an opportunity

of improving himself under the most celebrated medical teachers of that time. In London he studied under Hewson and Fothergill, and also attended the lectures and dissections of Drs. John and William Hunter.

From London he went to Edinburgh, well supplied with letters of introduction from Franklin to the leading men of the University. Among these letters was one to the celebrated Dr. Cullen, who had succeeded Dr. Plummer in the chair of chemistry.

Dr. Cullen received Morgan most kindly and became one of his staunchest patrons and friends.

After attending lectures at Edinburgh for two years, Morgan presented a thesis in Latin, on the formation of pus, and was granted the degree of M. D. by the University in 1763; some time after this, and before coming to America, he was also admitted as a licentiate of the College of Physicians of Edinburgh. From Edinburgh, Morgan went to Paris, where he spent the greater part of the winter in the study of anatomy, attending chiefly the dissections of M. Sue.

A memoir on the art of making anatomical preparations by corrosion, in which art he had, under the instruction of Dr. Hunter, become very proficient, secured for him admission to the Royal Academy of Surgery, as a corresponding member.

From Paris he took a trip through Italy. In Padua he paid his respects to the celebrated Morgagni, who, then eighty-two years of age, received him with great politeness and showed him many kindnesses. From Morgan's own account of this visit, it would appear that Morgagni was greatly impressed with the dexterity Morgan had developed in making anatomical preparations, and complimented him very highly on his proficiency in this direction.

Exactly where Morgan first evolved his plan of medical education, in connection with an established academy or college, does not appear in evidence; it was, however, some time after Dr. Shippen, Jr., had left for home. From the letter of recommendation sent by Dr. John Fothergill, with Wm. Shippen, Jr., it would appear that there had been some understanding to open private courses of lectures, probably at the suggestion of Dr. Fothergill, who had taken a deep interest in medical matters in the American colonies, and particularly in the province of Pennsylvania.

It is probable that it was not until Morgan arrived in Paris that his plans for medical education were fully matured. Once having

settled on a definite plan Morgan left no possible chance of improving or securing it escape him. It was in Paris that he wrote and

A

DISCOURSE

UPON THE INSTITUTION OF

MEDICAL SCHOOLS

IN AMERICA;

Delivered at a Public ANNIVERSARY COMMENCEMENT, held in the COLLEGE of PHILADELPHIA *May* 30 and 31, 1765.

WITH A

PREFACE

Containing, amongſt other things,

THE AUTHOR's

APOLOGY

For attempting to introduce the regular mode of practiſing PHYSIC in PHILADELPHIA:

BY JOHN MORGAN M.D.

Fellow of the Royal Society at LONDON; Correſpondent of the Royal Academy of Surgery at PARIS; Member of the Arcadian *Belles Lettres* Society at ROME; Licentiate of the Royal Colleges of Phyſicians in LONDON and in EDINBURGH; and Profeſſor of the Theory and Practice of Medicine in the College of PHILADELPHIA.

PHILADELPHIA:

Printed and ſold by WILLIAM BRADFORD at the Corner of *Market* and *Front-Streets*, MDCC,LXV.

Facsimile of Title-page of Morgan's Discourse.

elaborated on his discourse on the Institution of Medical Schools in America; it was also from Paris that the friends of the College of

Philadelphia, as well as his personal friends were first broached or consulted as to the feasibility or desirability of such an innovation.

On his return to London Morgan visited a number of the friends of the institution and secured from them letters of commendation for his plan of medical instruction.

Soon after his arrival in Philadelphia he proposed his plan for connecting a medical school with the College of Philadelphia to the Board of Trustees and also intimated that he was desirous of being appointed professor of the theory and practice of medicine. The project, ably presented and liberally endorsed by the Proprietor of the Province and other friends of the institution abroad, was unanimously adopted, and on the third day of May, 1765, John Morgan was duly appointed Professor of the Theory and Practice of Physic in the College of Philadelphia, the first chair of medicine in a regular chartered college in America.

At the succeeding commencement, on May 30th and 31st of the same year, Dr. Morgan delivered his discourse or defence of his proposed plan of education before a representative gathering of medical men, the members of the Board of Trustees and other friends of the institution.

This discourse, while it elicited commendation in some directions, was severely criticised in others. Morgan was accused of trying to transplant into a new country, ideas that were only suited to Continental practice and not at all adapted or adaptable to conditions in America.

The stand taken by Morgan at that time was, it is true, a revolutionary one from the point of view of the then medical practitioners. For Morgan, on the other hand, it was essential to be consistent with his training and his accomplishments.

To digress for a moment, it is unfortunate indeed that this little pamphlet, the first and one of the most valuable of American medical classics, is not more available at the present time, as much of the contained material would be well worth bringing to the attention of medical students and medical practitioners of the present time.

Much of the credit for the high ethical stand taken by this first Professor of Medicine is no doubt due to Benjamin Franklin, whose letters of introduction secured for Morgan the friendship and patronage of men at the very head of their profession in Europe. The advantage, in a professional way, of not dispensing medicines, was

no doubt impressed on him during his travels on the Continent, although as a Licentiate of the College of Physicians of Edinburgh he would have been expected to abide by the adopted rules or code of ethics. This college had, as early as 1754, adopted an Act that prohibited their Fellows and Licentiates from taking upon themselves to use the employment of an apothecary, or to have or to keep an apothecary shop.

How thoroughly he was imbued with the expediency of his plan is well illustrated by his "Discourse," while the title-page of this dissertation, as published, indicates the opposition that his remarks met with at the very start.

To give an accurate idea of the earnestness with which Morgan pleaded his case we cannot do better than quote some of the arguments as he presented them. In speaking of the desirability of separating the several branches of the practice of medicine he says:

"We must regret that the very different employment of physician, surgeon and apothecary should be promiscuously followed by any one man. They certainly require very different talents.

"The business of pharmacy is essentially different from either, free from the cares of both, the apothecary is to prepare and compound medicines as the physician shall direct. Altogether engaged in this by length of time he attains to that skill therein which he could never have arrived at were his attention distracted by a great varietv of other subjects.

"The wisdom of ages approved by experience, the most certain test of knowledge, has taught us the necessity and utility of appointing different persons for these different employments, and accordingly we find them prosecuted separately in every wise and polished country.

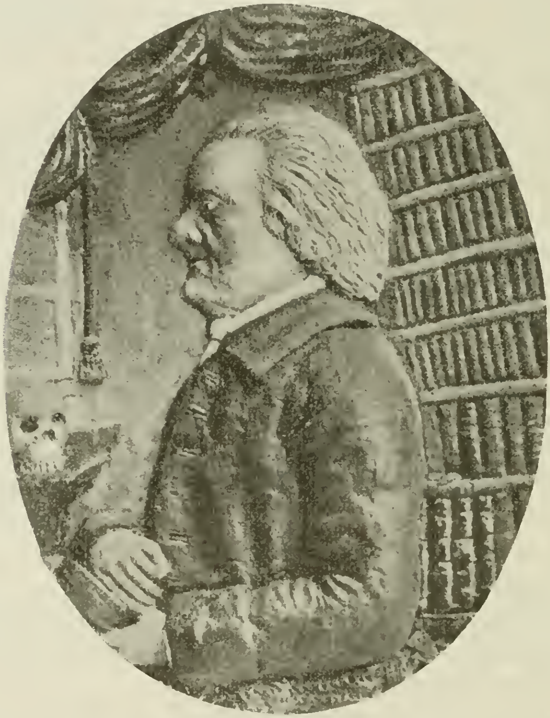
"The paying of a physician for attendance and the apothecary for his medicines apart, is certainly the most eligible mode of practice both to the patient and practitioner. The apothecary, then, who is not obliged to spend his time in visiting patients, can afford to make up medicines at a reasonable price, and it is as desirable as just in itself that patients should allow fees for attendance—whatever it may be thought to deserve.

"They ought to know what it is they really pay for their medicine and what for medical advice and attendance."

Morgan's plan of confining himself exclusively to the practice of medicine did not meet with the approval of his contemporaries, even such of them as had attained a medical degree abroad.

It was not until 1774 that he had even a single follower. This first physician to adopt Dr. Morgan's plan of writing prescriptions for his patients deserves more than passing notice, as he was one of the most interesting and picturesque of the historical characters of the revolutionary period in Philadelphia.

Dr. Abraham Chovet, was a native of England, where he is said to have been a demonstrator of anatomy for a number of years. He lived for a time in Barbadoes and later in the island of Jamaica,



DR. ABRAHAM CHOVET.
Reproduced from "The History of Medicine in the United States."
By Dr. Francis R. Packard.

The history of this picture is rather an interesting one. The original is a wax medallion, now the property of the Pennsylvania Hospital. The picture was first published in Norris's "Early History of Medicine in Philadelphia," where it is stated that the original was made on May 25, 1784, Dr. Chovet's eightieth birthday, by his servant, Dr. Eckhout. Some time after Dr. Chovet's death his daughter, Susannah Maria Penelope Abingdon, gave the medallion to Christopher Marshall, one of the Fighting Quakers and an early Philadelphia druggist; he, in turn, appears to have willed it to his son Charles Marshall, the first president of the Philadelphia College of Pharmacy, who, on his death, left it to his eldest daughter, Elizabeth Marshall, the first woman pharmacist in America; she, in turn, left it to her younger sister Mary Ann Marshall, and she on December 25, 1877, presented the medallion to the Pennsylvania Hospital, where it is treasured among the historic relics that have been gathered together, from time to time, in that, *itself*, historic institution.

from the latter place he came to Philadelphia about 1774, being then a man well advanced in years.

The doctor was an eccentric but extremely original character. He appears to have been a man well known about town and is mentioned more frequently, perhaps, in the local histories and memoirs of the revolutionary period than any of his contemporaries.

Christopher Marshall in his "Remembrancer," has several anecdotes relating to him, and also describes his lectures on anatomy, which were held in a building in Vidall's Court. This building was referred to by Mr. Evan T. Ellis in his "Story of a Very Old Philadelphia Drug Store" (A. J. P., 1903, page 57).

Dr. Chovet died March 24, 1790, in his 86th year. He was buried in Christ Church, his dying request being that he might have a plain funeral, and that no bells be tolled on the occasion, as he did not wish to disturb sick people by such unnecessary noise. One characteristic saying of his, that might well be quoted here, was "That physician was an imposter that did not live until he was eighty."

Despite the fact that Dr. Chovet was over seventy years of age when he came to Philadelphia, did not dispense medicines, and was, in addition, a notorious Tory, he soon had one of the most desirable practices in the city.

The second medical practitioner to follow Morgan's example was John Jones, a native of Long Island, who had received a portion of his medical education in Philadelphia.

Jones is usually spoken of as having been an apprentice to Thomas Cadwalader, the first physician to give demonstrations and lectures on anatomy. Dr. Norris in his "Early History of Medicine in Philadelphia," also refers to John Jones as having been a pupil of Lloyd Zachary, whom Jones himself is said to have described as "a person whose whole life has been one continuous scene of benevolence and humanity."

After visiting Europe, Dr. Jones settled in New York, where he devoted himself particularly to the practice of surgery. He was the first professor of surgery in the New York Medical School, and subsequently published what is probably the first comprehensive surgical work written in this country, "Plain Remarks on Wounds and Fractures;" this is said to have been published first about 1765 Editions of it are known to have been published in 1775, 1776 and 1795.

Jones removed to Philadelphia in 1779, and in the following year he was elected as one of the surgeons of the Pennsylvania Hospital. On inquiry, he was so much impressed with the advantages of Dr. Morgan's plan of writing prescriptions that he decided to follow his example.

Dr. George W. Norris in his "Early History of Medicine in Philadelphia," says that these three men, Morgan, Chovet and Jones, were the first to adhere closely to the practice of writing prescriptions. They rapidly came into public esteem, and, other physicians seeing the manifest advantages enjoyed by these men, soon fell into the same practice. Once in vogue, the custom spread rapidly, so that by the end of the eighteenth century the writing of prescriptions was quite a common practice in all of the larger cities of the United States.

The story of the founding of the first medical school in America might well be repeated here, particularly as in all popular accounts Dr. Morgan is not given the credit that is rightfully due him. It is true that Norris, Ruschenberger and Packard give Morgan due credit. Many other writers, however, content themselves by quoting the statement made by Rush, in his introductory lecture, November 2, 1789, in which he said, "It was during his absence from home that he concerted with Dr. Shippen the plan of establishing a medical school in this city."

It is true that Dr. Shippen on his return from England opened a course of lectures on anatomy, and continued the same for at least three years. This plan of private lectures appears to have been inaugurated at the suggestion of the celebrated Dr. John Fothergill, who, as noted before, had always taken a deep interest in all matters relating to the advancement of the practice of medicine in the American Colonies. But even in this venture, Shippen could not claim to have really been the first. As early as 1752, William Hunter, a native of Scotland, and a pupil of the elder Monro, settled in Rhode Island and gave lectures on anatomy and comparative anatomy at Newport, in 1754, 1755 and 1756.

Thomas Cadwalader, as early as 1742, made dissections and gave demonstrations for the benefit of his contemporaries who had not had an opportunity of going abroad. There is also a record that sometime before 1647, Giles Firmin "made an anatomy and read on it very well" in Boston.

Dr. Morgan in his first communication to the Board of Trustees of the College of Philadelphia, and also in his discourse, awards full credit to all previous lecturers, and, in referring to his plan of establishing a school of medicine in connection with the college, says: "What led me to it, was the obvious utility that would attend it, and the desire I had of presenting, as a tribute of gratitude to my alma mater, a full and enlarged plan for the institution of medicine in all its branches in this seminary, where I had part of my education, being among the first sons who shared its public honors. I was further induced to it from a consideration that private schemes of propagating knowledge are unstable in their nature, and the cultivation of useful learning can only be effectually promoted under those who are patrons of science, and under the authority and direction of men incorporated for the improvement of literature."

In speaking of the necessary professorship of anatomy, Dr. Morgan says: "Dr. Shippen having been concerned already in teaching that branch of medical science is a circumstance favorable to our wishes, few here can be ignorant of the great opportunity he has had abroad for qualifying himself in anatomy, and that he has already given three courses in this city, and designs to enter upon a fourth course next winter."

Shippen subsequently applied for, and was given, the chair of anatomy and surgery in the College of Philadelphia.

Dr. Morgan was undoubtedly the first teacher of the theory and practice of medicine, materia medica, pharmacy and pharmaceutical chemistry in America. That he taught all of these branches appears from the announcement of the first course of lectures in the College of Philadelphia, quoted from the *Pennsylvania Gazette* for September 26, 1765.

A course of lectures on Materia Medica, by John Morgan, M.D., etc. Price four pistoles.

The course will commence on the 18th day of November, and will be given three times a week at the college, at three o'clock in the afternoon, till finished, which will last between three and four months.

To render these lectures as instructive as possible to students of physic, the Doctor proposes, in the course of them, to give some useful observations in general, and the proper manner of conducting the study of physic.

The authors to be read in the materia medica will be pointed out. The various substances made use of in medicine will be reduced under classes suited to the principal indications in the cure of diseases. Similar virtues in different plants, and their comparative powers will be treated of and an inquiry made

into the different methods which have been used in discovering the qualities of medicines, the virtues of the more efficacious will be particularly insisted upon; the manner of preparing and combining them will be shown by some instructive lessons upon pharmaceutic chemistry and pharmacy. To prepare them more effectually for understanding the art of prescribing with elegance and propriety, if time allows, it is proposed to include in this course some critical lectures upon the chief preparations contained in the Dispensatories of the Royal College at London and Edinburgh. The whole will be illustrated by many useful and practical observations on diseases, diet and medicines.

This rather comprehensive announcement was followed in 1766 by another, which read in part:

A course of lectures on the "Theory and Practice of Physic" will be delivered for the benefit of Medical Students, with a preparatory course on Botany, Chemistry and the Materia Medica, being the substance of a set of lectures delivered to his pupils last winter.

That Morgan had been the acknowledged teacher of chemistry in the medical school of the College of Philadelphia would also appear from the following letter, written by Dr. Rush, as an application for the chair of chemistry.

GENTLEMEN:—As the professorship of chemistry which Dr. Morgan has sometime supplied is vacant, I beg to offer myself as a candidate for it.

Should you think proper to honor me with the chair, you may depend upon my doing anything that lies within my power to discharge the duties of a professor, and to promote the reputation and interests of your college.

I have the honor to be, with the greatest respect,

Your most obedient humble servant,

BENJ. RUSH.

Philadelphia, July 31, 1769.

Dr. Morgan was one of the founders of the first medical society in the Province. This was the "Philadelphia Medical Society," organized February 4, 1765. Several years later this society was united with the "American Society for Promoting Useful Knowledge," and this, in 1769, was united with the Philosophical Society to form the well-known "American Philosophical Society held at Philadelphia for promoting useful knowledge."

The Philadelphia Medical Society included the names of a number of the leading medical men of Philadelphia, among them John Morgan, J. Kearsley, Jr., Gerardus Clarkson, Thomas Cadwalader, James A. Bayard, Robert Harris, George Glentworth, John Redman and Benjamin Rush.

These members continued a semblance, at least, of their organiza-

tion under the new titles, first as the Medical Committee of the American Society for Promoting Useful Knowledge, and later as the Committee on Medicine and Anatomy of the Philosophical Society.

Dr. Morgan, as early as 1767, suggested the feasibility of forming a College of Physicians.[1] The proposition did not meet with the sanction of the proprietor, Thomas Penn, who in a letter to his brother, Richard Penn, dated February 27, 1767, said: "I think it very early for such an establishment, and wish the faculty would not press for such a thing. I shall confer with Dr. Fothergill upon it." The resulting conference does not appear to have resulted favorably, as nothing more was heard of the project for the time.

Dr. Morgan was married on September 4, 1765, to Mary, daughter of Hon. Thomas and Mary (Johnson) Hopkinson. In 1773 he visited Jamaica to obtain donations for the department of general literature in the College of Philadelphia. In the same year he was elected to serve on the staff of the Pennsylvania Hospital, in which capacity he served until 1777; he was re-elected in 1778 and served to 1783, when he resigned.

His first resignation from the hospital was due to his discharge from the medical service of the Continental Army.

In 1775 he had been offered and accepted the office of Director-General and Physician-in-Chief of the American hospitals.

In this position he provoked the antagonism and jealousy of many of his subordinates, who, by false charges and political intrigues, forced his discharge in 1777. This dismissal was a severe blow to Dr. Morgan, and although he was subsequently acquitted of all charges by a committee appointed by the Continental Congress, he, for the time being, considered himself disgraced, and withdrew from all public offices.

January 2, 1787, is the recorded date of the first meeting of The College of Physicians of Philadelphia, twenty years after such an institution was first proposed by Dr. Morgan. Prominent among the first Fellows were the names of the then leading practitioners, Dr. Morgan, Dr. Chovet and Dr. Jones, while a number of the remaining senior fellows had also been members of the Philadelphia Medical Society.

Morgan did not long survive the inauguration of the College of Physicians. He died October 15, 1789, and was buried beside his wife in the middle aisle of St. Peter's Church, Philadelphia.

The prognostications made by Dr. Morgan, in his inaugural address, have long since been fully realized. The school that he founded has grown in strength and usefulness and its graduates, among them men of more than ordinary abilities, have done it and their profession honor. Other useful institutions have been established, and together they have striven to spread the light of knowledge to all portions of the country.

Realizing the success that has ultimately attended his efforts it is indeed more than passing strange that the one who contributed so much to the introduction and advancement of the higher ideals in medical practice, should never have received the honors that are justly due him. The school he founded and its alumni have never made an adequate recognition of his efforts in their behalf, while pharmacists have never given him even a moiety of the recognition due him, for his independence and perseverance, in introducing the regular mode of practicing physic into America, despite the criticism and opposition of his contemporaries.

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HISTORY OF ECHINACEA ANGUSTIFOLIA.[1]

By John Uri Lloyd.

This drug, which has slowly wedged its way into attention, is persistently forcing itself into conspicuity. The probabilities are that in time to come, it will be ardently sought and widely used, for it is not one of the multitude that have flashed into sight, been artfully pushed, then investigated, found wanting, and next dropped out of sight and out of mind. It seems proper, then, that the history of this drug should be recorded in an authoritative way, where it can be referred to in time to come, and that this record is appropriate to the section on historical pharmacy of our association seems rational, and it also seems consistent that the record should be made in a familiar and discursive manner, rather than stiff and precise.

For sixteen years preceding 1885, Dr. H. C. F. Meyers, of Pawnee City, Neb., prepared a secret remedy, which he called "Meyers' Blood Purifier." He was an enthusiast in the belief that this remedy was a cure-all for any and all diseases dependent upon depraved blood. He was an empiricist, and commended his blood purifier without reserve in such affections as seemed in its sphere. In 1885 the Doctor conceived the idea of enlarging its field of usefulness, and at the same time profiting by the returns from his discovery. He, therefore, wrote to Prof. John King, of Cincinnati, and to myself, describing his blood purifier, stating that its value depended upon a Western plant unknown to medicine, and that he would like to introduce the remedy to physicians generally. He cited many cases where his remedy had effected cures of rattlesnake-bite, depraved blood affections, etc., etc., stating that "in more than six hundred cases this remedy has failed not once to cure. It is not a poison, the medicament acts on blood and nerve." (Extract from letter.)

[1] Read at the American Pharmaceutical Association, 1903, Historical Section. The specimens named in this paper are in hand of the Society Section.

The letter-head of Dr. Meyer heralded the remedy in conspicuous type, as follows:

Office of
H. C. F. Meyer, M.D.,
Manufacturer and Proprietor of
Meyer's Blood Purifier,
Pawnee City, Neb.

Professor King consulted me concerning the subject, the supposition being that, as usual, the preparation would be found either to contain some well-known drug or to be an exaggeration of statement. However, as was our custom with all others concerned in materia medica directions, we wrote Dr. Meyer to the effect that if his remedy was to be introduced to the medical profession through the eclectic school of medicine, according to the inexorable rule of our school, the botanical name of the drug would necessarily have to be made public. Neither of us could concern ourselves in the matter unless he was willing to do this. Dr. Meyer then forwarded Dr. King and myself specimens of the root, which to me was new. (See specimen "A" herewith of original root.) On May 26, 1886. I wrote him that I could not from that root fragment determine the matter, and that he would have to supply me with a botanical specimen of the plant. Under date of June 7, 1886, through McCullah & Graham, druggists, Pawnee City, Neb., he sent me a box of the root, which, however, naturally, did not give me the opportunity to classify the plant. On writing him to this effect, he next, September 28, 1886, mailed me the whole plant, which Mr. C. G. Lloyd identified as Echinacea angustifolia, or the "nigger head" of the West. (See specimen "B.") Owing to the close relationship between this plant and the well-known Echinacea purpureum, or "black Sampson," long used in domestic medicine and familiar to eclectics and herbalists, I did not seriously consider the drug as one promising to fulfil Dr. Meyer's anticipations. However, Dr. King, with his usual thoughtfulness, consideration and care, proposed to investigate the matter, and, from the drug forwarded me by Dr. Meyer I at once made for Dr. King several specimens of liquid preparations, and then I passed the subject from mind as one among a multitude of such before me, destined to remain in obscurity.

After some months, Professor King informed me that he was very favorably impressed with the action of the preparations made for him,

and advised that the remedy be placed in the hands of other physicians of experience in whom he had confidence, and to whom he wrote. Accordingly, I placed the preparation that Dr. King preferred in the hands of Prof. I. J. M. Goss, M.D., of Atlanta, Ga., Prof. H. T. Webster, M.D., of Oakland, Cal., and others, who investigated the remedy after the suggestions of Dr. Meyer and Professor King, and, if I mistake not, Dr. Meyer also corresponded with these gentlemen.

Two years after the beginning of the investigation, Professor King, in the 1887 *Eclectic Medical Journal*, page 209, wrote an article on the therapy of the drug Echinacea, which was the first published reference thereto, and this was followed by an article by Professor Goss. When Professor Webster's work on "Dynamical Therapeutics" appeared, he gave Echinacea considerable conspicuity, which was the first authentic attention received by this plant in a book under covers. These works by professional men of distinction, led to attention from eclectic physicians, their contributions to eclectic literature becoming frequent. From this date, the name and claims and uses of the remedy crept gradually outside of our school.

In 1893, Mr. C. G. Lloyd contributed to the *Eclectic Annual*, page 332, an article on the drug and its identification, for many persons were then confusing Echinacea purpureum with Echinacea angustifolia. All of this time, I was rather resisting the claims made by the enthusiastic friends of Echinacea angustifolia, believing that conservatism is to be preferred to over-enthusiasm, and yet one conspicuous object-lesson before me in its early history led me to be more tolerant in its behalf than otherwise I might have been. The wife of Professor King had long since been attacked by a cancer, and Professor King had tried every remedy that he could think of as a palliator, and at last turned to the preparations of Echinacea, which, as claimed by both Mrs. King and himself, gave her the only relief she had obtained. According to Professor King, it retarded the progress of the enemy as no other remedy had done. For years she had suffered with this cancer, and informed me herself that when Echinacea was not used she noticed an immediate change for the worse. To such an extent did she believe in the use of Echinacea that, on her account alone, before the remedy was known to others, I made it a duty to keep a constant supply on hand, and to the day of her death she could not do without Echinacea. That it palliated this individual case I had no doubt, and this personal instance, as I

have said, removed my prejudice and led me to a much greater toleration for other statements. And yet, the record of the overly famed Sarsaparilla, Stillingia, and such drugs, were ever in mind.

In this connection it may be stated that Dr. Meyer was so positive that Echinacea was a certain cure for the bites of poisonous insects and rabid animals as to lead him to desire to give the professions an exhibition of its power in that direction. For this purpose he proposed to come to Cincinnati, and, if we could not get a vicious rattlesnake in this locality, to bring a supply of serpents with him, and then, in the presence of selected medical authorities, permit these serpents to bite him freely, when they were in unquestionable condition, and then to counteract the poison by the use of Echinacea, internally and externally. He urged that this be done, which course, however, Professor King and myself positively refused to sanction. Dr. Meyer, however, claimed that he had been bitten repeatedly, and that there was no danger.

From the dates given, the drug Echinacea gradually crept into notice, and now, after nearly twenty years have passed since the investigations were instituted, the drug is becoming conspicuous with the profession, and I will add that, in my opinion, it is destined to become more so.

Owing to the resemblance of the flower heads of Echinacea angustifolia, "nigger head," to Echinacea purpureum, "black Sampson," and also to several species of plants related to the sunflower family, this drug is now, as found upon the market, of very uncertain quality. I have known the root of a plant not related to it, thrown upon the market under the name Echinacea angustifolia, in large quantities, from sections of the country where Echinacea does not grow. Large amounts of so-called Echinacea have been sold in commerce, differing in every way from the true drug, which grows in great abundance throughout Kansas, Oklahoma, Nebraska, and other sections of the West and Southwest. Large amounts of Eryngium aquaticum have been dug and sold as Echinacea. The root may be superficially described as follows, as contributed by me to the *Eclectic Medical Journal* for August, 1897, to which I will add that no attempt is made in this description other than to point to some of its conspicuous characters:

Characteristics.—Echinacea root has a brown or brown-red color. It is much wrinkled longitudinally, and the folds of the shrunken

epidermis sometimes twist about the root in spiral form. When sliced transversely, the yellowish medullary rays are seen to be separated from each other by a greenish pulp, and when the dried root is broken, the fracture always presents the appearance of having been afflicted with dry rot. Upon chewing the root of prime Echinacea, a sweetish taste first presents itself, which upon prolonged chewing becomes acrid and tingling, which remains long to affect the tongue. This sensation reminds one of aconite, but it is devoid of the benumbing quality of aconite, and, unlike aconite, it increases the flow of saliva, instead of inducing dryness of the tongue. Indeed, in its early record, more than one physician inferred from the similarity of the taste, that by mistake aconite had been sold under the Echinacea label and wrote me concerning the subject. In early experience with the drug, I found insipid, tasteless lots of the genuine plant, that proved worthless in medicine. These specimens all came from low, wet lands east of the Mississippi River, for the plant is not confined exclusively to the West, and varies much in quality.

Echinacea contains minute amounts of a colorless alkaloid, which, however, does not constitute the therapeutical qualities of the drug. It contains much sugar, and large amounts of coloring matters, which prove injurious if allowed to remain in its preparations. The sensible constituent is a colorless, organic substance of acid reaction, which imparts the sensible properties to the drug, being intensely acrid and persistent—distressingly so in a pure condition. It exists in prime Echinacea in minute amounts, less than ½ of 1 per cent., and is probably in itself a mixture.

Accompanying, please find specimens of the plant and root of Echinacea, being the original drug, as sent me direct from the hands of its discoverer, Dr. Meyer.

GARDENS OF MEDICINAL PLANTS.

BY ALBERT SCHNEIDER.

I. PREFATORY.

A paper on this subject cannot be made retrospective nor in the form of a review, since with a few exceptions there are no extensive gardens or parks entirely devoted to the cultivation of medicinal plants. The present object is rather to give a few suggestions as to

the significance and value of such gardens to the progress of pharmacy and medicine, and how such gardens may be established in the United States. On careful consideration it becomes evident that gardens devoted to the cultivation of medicinal plants are the direct outcome of the development and evolution of botanical gardens in general. It is true that many medicinal plants are cultivated on a large scale, but such plantations are not true gardens of medicinal plants any more than are agricultural fields botanical gardens in the ordinary acceptance of that term. The following very briefly condensed historical review will give some idea of the very recent origin of gardens of medicinal plants, and will furthermore serve to explain more fully the plan to be proposed.

II. HISTORICAL.

Botanic gardens date back to remote antiquity. We are justified in mentioning the gardens of tradition and myth to show that the mythical idealization is intimately associated with realization. The Jewish "Gan-eden," or Paradise, was supposed to have been situated in Persia or Armenia, and according to others in Chaldea. The gardens of Hesperides (tree or fruit gardens) were supposed to have been in Africa, near Mt. Atlas. There are the promised gardens of Mohamet, the gardens of Laërtes, and the gardens of Alcinoüs so fully described in Homer's Odyssey. These gardens of the imagination simply show that the human mind has ever associated joy, happiness, and pleasure with luxuriant vegetation.

Coming now to gardens of tradition which perhaps had some foundation in fact, we may first of all mention the royal gardens of the ancient Egyptians, which were of remarkable splendor. They were established on a grand scale about palaces, but were characterized by a paucity of species, consisting largely of palms and a few fruit trees and culinary vegetables. The country about the Egyptian catacombs was also converted into gardens. The Babylonian or Assyrian gardens (about 2000 years B.C.), though their existence is purely problematical, were described as magnificent, and were reckoned among the wonders of the world. They were built on elevated structures, supported by enormous pillars. The garden patches were laid out in squares with remarkably constructed terraces. Fountains kept the air cool and watered the plants. Equally wonderful and problematical were King Solomon's gardens and the earlier Persian and Grecian gardens.

The earliest comparatively authentic records of botanic gardens are those of the Romans. The first described is that of Tarquinius Superbus (534 B. C.), adjoining the royal palace at Rome. Among other plants, roses, poppies, lilies, peaches, apricots and cherries were cultivated. The villas of Cicero at Arpinum, of Sallust on the Quirinal hill, and those of Nero were noted for their beauty. In addition to these private gardens of the nobility there were also gardens established about temples, places of worship, and burial places which may be compared to the public parks and cemeteries of to-day. The term *hortus* as defined in the laws of the *decemviri* included a garden and country house. The garden devoted to kitchen plants was known as *hortus pinguis.* In spite of the fact that the larger Roman gardens were chiefly for pleasure and recreation, they contained many useful fruit trees, shrubs and herbs, besides flowers. Flowers were greatly prized and they figured very significantly at feasts, frequently enormous sums being expended for them. The following useful plants were introduced and grown: The fig and almond from Syria, the citron from Media, the peach from Persia, the pomegranate from Africa, the apricot from Epirus, apples, pears and plums from Armenia, cherries from Pontus. They cultivated sweet and sour apples, including a seedless variety; thirty-six varieties of pears, as early and late, large and small, hard and mellow; three varieties of quince; varieties of services and medlars; black, white and variegated plums; numerous varieties of cherries, several varieties of olives; they cultivated varieties of grapes—some were thick-skinned (*duracina*), others thin-skinned; one vine at Rome produced enough grapes to make 12 amphoræ (84 gallons) of wine. Some grapes were spherical, others oval or elongated. One was called *dactylides*, because the fruits were long like fingers. They cultivated figs, mulberries, and perhaps also raspberries and the brambleberry; further, hazelnuts, filberts, beech, mast, pistachias, walnuts (*Juglans*, from *Jovis glans*, the fruit of Jove), chestnuts, St. John's bread (Carob bean from *Ceratonia siliqua*), pines, gourd, cucumber, melons, cabbage, pea, bean, kidney bean, turnip, carrot, parsnips, skirret, radish, sorrel, asparagus, onions, garlic, endive, lettuce, succory, mustard, parsley, arache, alisander, dittander, elecampane, fennel, chervil and mushrooms. This catalogue gives some idea of the extent to which useful plants were cultivated, and what we of today owe to Roman influence and effort. There is no record, how-

ever, to show that the Romans made any attempt to arrange or group plants according to any definite system or to give the gardens any scientific rank. Useful and beautiful plants were introduced from other countries as they were found during war-like invasions. No special efforts were made to cultivate plants of medicinal value, excepting a few herbs in the vicinity of temples devoted to medicine, such as the temples dedicated to Esculapius.

Through Roman influence gardens were gradually established throughout Italy, centuries after the fall of Rome. Like the Roman villa gardens, most of these were private property. In fact, nearly all of the real gardens of antiquity were the pleasure grounds of opulent mortals. With the introduction of Christianity the polytheistic temple and sacred gardens were destroyed or neglected or sometimes continued as gardens of the monasteries; the gardens of burial grounds continued as before. The similarity between the Roman villa gardens and the later gardens of Italian baronial castles and gardens of the monastic establishments of the Middle Ages is very apparent. According to Castellan several monasteries were built on the ruins of Roman villas, copying the ancient grouping of buildings, structure of porticoes, terraces, arcades and the range of the gardens and pleasure grounds, etc.

From Italy the establishment of gardens spread northward and westward. There is a very close similarity between the Italian baronial castles and those of northern Europe and, as in the past, the private gardens of the nobility, as well as the more public parks and cemetery gardens were essentially for pleasure and recreation rather than utility.

The statements thus far made with regard to botanical gardens of antiquity apply not only to the countries referred to, but also largely to Asia, Arabia and India. Arabian and Chinese physicians have, however, for many centuries given some attention to the cultivation of medicinal plants, and the same may be said of Indian priests, though no very reliable data as regards the scope of such work are obtainable. Of the earlier European rulers there is only one, namely, Karl der Grosse (Charlemagne), who gave considerable attention to the introduction and cultivation of economic plants, including medicinal plants. The monks of the dark and later ages apparently had an eye to utility, and they gave some attention to the cultivation of medicinal plants. Heretofore the "herb-gatherers" relied almost

wholly on wild-growing species, but with the increased population and the cultivation of the soil, it became necessary to cultivate these plants and these earlier monastic gardens are really the progenitors of our modern gardens devoted to the cultivation of economic plants, especially gardens of medicinal plants.

Extensive public gardens, established on a scientific and far-reaching economic basis, are of comparatively recent origin. There were none worthy of note prior to the latter part of the sixteenth century. The first European public garden was established at Padua about 1533 or somewhat later (1545); in this garden considerable attention was given to the cultivation of "simples" (medicinal herbs). Shortly after these dates, other public gardens were rapidly established in different parts of Italy, notably the Palermo gardens and the botanic garden at Venice, which was formerly the monastic garden of San Giobbe.

The first extensive scientific and economic garden was the Jardin des Plantes of Paris, founded by Louis XIII in 1610 and put into active operation in 1634. La Brosse, the first director, remarked that during that period it had "eighteen years of persecution and six of culture." Under the direction of Thouin (during the first years of the consulship), this garden became firmly established as a school of botany and plant culture. Its objects were, first, to collect useful or remarkable plants from every part of the world and to distribute them to every part of France and so far as practicable to every other country, and, second, to form a school of botany, botanical research, and an experimental garden. A universal correspondence was established through which plants were secured from all over the world. Collectors were sent out at the expense of the government, and all material secured was conveyed duty free. Every war-like, exploring or commercial expedition was accompanied by officially appointed naturalists, to whom every facility was given for work in the interests of the garden. Plants received were propagated without loss of time and distributed, in the first place, to other botanic gardens of France; next, seeds and plants were sent to such of the French colonies and possessions as might profit by them, and lastly, material was sent to foreign correspondents in exchange for similar favors received or expected. The influence of this garden has been far-reaching. All other extensive botanic gardens of the world are copied after this one. The garden is the means of each year add-

ing millions of dollars to the resources and wealth of the French nation and, in addition, it is a powerful factor in public instruction, and has, furthermore, been the means of developing scientific research which has directly or indirectly added greatly to the health, happiness and comfort of the masses, besides giving French investigators in botany first rank.

The Jardin Botanique de la Faculté de Médicine, devoted entirely to the cultivation of medicinal plants, is only a part of the Jardin des Plantes, and was established in 1869. Some 2,000 species are now under high cultivation in a limited area (about nine acres of ground). Since 1877 the garden has been open to the public from the fifteenth of March to the first of November of each year, between the hours of six to six of each day. Students of medicine are admitted on the presentation of cards and are given special privileges when desired. Plants are grouped according to the natural orders and the orders are grouped according to structural similarities. A broad walk separates monocotyls and dicotyls. In connection with this garden there is a museum in which are placed on exhibition vegetable drugs and their derivatives, pharmaceutical preparations, and other materials of interest to medicine and pharmacy. Excellent opportunities are offered to do research work in regard to medicinal plants in the laboratories of chemistry, pharmacology and botany of the Ecole de Médicine of Paris.

The example set by the Jardin des Plantes has been adopted by other countries. At the present time France, England, Germany, Austria, United States, Italy, Holland and Russia have extensive gardens of great economic and scientific value, similar in scope to the Paris gardens. In these the chief attention is given to what are commonly called useful or economic plants, including many medicinal plants.

The largest single botanic garden in the world is the Buitenzorg garden of Java, founded by the Dutch Government in 1817. It occupies 1,100 acres, with a range in altitude from sea level to 6,000 feet. The location with the altitudinal range makes it suitable for the cultivation under natural conditions of nearly all kinds of plants.

The second largest gardens are the Royal Botanic Gardens at Kew, near London, with an area of 260 acres, founded by Lord Capel in 1759. This garden, with its numerous territorial and colonial substations, has at the present time even a wider influence than the

Paris gardens and is the one potent factor in developing the agricultural, horticultural and general botanical resources of the British Empire. The third largest botanic garden in the world is the New York Botanic Garden, in Bronx Park, New York City, established in 1891. It is liberally endowed and well equipped with every means for botanical research and investigation. Substations are being established. The management has just secured the control of the Cinchona station of Jamaica. Dr. N. L. Britton, the director-in-chief, and Dr. D. T. McDougall, the associate director, have already developed the economic and scientific features of this garden to a remarkable degree. This garden is now about to undertake the extensive cultivation of medicinal plants under the direction of Dr. H. H. Rusby, who is pre-eminently qualified to undertake this work.

Additional gardens of great scientific and economic value and wide influence are those of Berlin, Vienna, Dublin, Edinburgh, Palermo, Naples, St. Petersburg and others. Of these the royal gardens of Berlin and Vienna are the most important and deserve special mention for the thorough manner in which they are managed and maintained. In the United States the State Experimental Stations established and maintained by the Government and working under the direction of the Department of Agriculture at Washington, D. C., are doing a remarkable work in combating plant diseases, developing agricultural and horticultural resources, forming new and desirable garden and field varieties, and working in the interests of botany in general. No other country is doing as much in the interests of agriculture. Nor must one forget the work of the experimental stations and horticultural societies maintained by state appropriations.

The Paris garden above referred to is perhaps the largest and most complete garden of medicinal plants in the world. As already stated, some medicinal plants are grown in all of the larger economic gardens. It is also true that certain medicinal plants are promiscuously cultivated on an extensive scale in various countries. For example, cinchona in India, Java, South America; spices in various tropical islands, especially those belonging to Holland and England; cocoa in South America; saffron and licorice in Spain; rhubarb in Russia, chamomile in Germany; ginseng in the United States and China; tea in China; ginger in Jamaica; vanilla in Mexico, etc. There are furthermore gardeners in all countries who de-

vote their entire time time to the growing of medicinal plants. These various plantations, great and small, limited or extensive in the number of species grown, devoted to the cultivation of medicinal and related plants for commercial purposes, are not gardens of medicinal plants in the present acceptance of that term, any more than a wheat or corn field is a botanic garden in the sense in which the term is here used.

In the United States beginnings have been made to establish scientific gardens devoted wholly to the cultivation of medicinal plants. A small area is set aside for that purpose in the St. Louis botanic gardens. A similar small garden is maintained at Ann Arbor in connection with the department of pharmacy of the State University. The Berkeley (State University of California) gardens have about 100 species of medicinal plants among the economic plants under cultivation. Similar beginnings are no doubt made in other States. In addition to these there are instances of private individuals who have attempted such gardens with more or less success; but so far as known to the writer there is no extensive garden of medicinal plants in the United States.

With this brief historical review an attempt will now be made to outline briefly a plan for the establishment of gardens of medicinal plants in the United States. The criticism may be made that this is premature, but in consideration of the fact that partially successful and abortive efforts have been made to establish such gardens, and furthermore the fact that to the writer's certain knowledge plans are now being matured to establish several such gardens on a comparatively large scale makes it highly appropriate and desirable that there should be an opportunity for exchange of ideas and plans, in order that there may be a minimum waste of energy and money in establishing these gardens and that they may work for mutual benefit. The following suggestions are based upon facts thus far obtainable and give the writer's idea of what should be the scope and purposes of such gardens. It should also be noted that the time has passed when it is excusable to start a new and desirable or necessary enterprise on a small scale. In order that the undertaking may fulfill requirements and expectations it should be liberally supported and given the right start. Of course, allowance must be made for a reasonable length of time to mature full plans and to put them in operation.

III. PURPOSES OF GARDENS OF MEDICINAL PLANTS.

(*a*) These gardens should be open to all, thus serving as a very efficient means of instructing the general public.

(*b*) They should serve as a source of special instruction to students of pharmacy and medicine. Most students of pharmacy are familiar only with the dried plant parts used medicinally and the preparations made therefrom, and have practically no conception of the appearance of the living plants from which these dried specimens are obtained. In this respect students of medicine know even less. These are deficiencies in the education of pharmacists and physicians which could be supplied by the gardens of medicinal plants.

(*c*) These gardens would be the only efficient means of developing the possibilities in the State or community for the successful cultivation of plants of medicinal value. They would thus no doubt add millions of dollars annually to the resources of the United States. They would be the means of opening up new chemical, pharmaceutical and medical laboratories and manufacturing establishments, which we are now obliged to patronize in foreign countries.

(*d*) In order that a maximum of good or desirable results may be obtained there should be several large gardens of medicinal plants established in the United States. The least profitable is duplicate work; it would therefore be desirable that these various gardens should be supplemental to each other in developing the resources of the country with regard to medicinal plants. While this is of the highest importance, it is at present premature to formulate a complete plan. A suggestion would be for the movers in the establishment of the various gardens now planned to meet in the near future, say at St. Louis or Kansas City next summer, and mature plans. To illustrate, the following gardens are already launched or are being planned: New York botanic gardens (ready for active work); Shaw botanic gardens, St. Louis (in operation); Philadelphia (contemplated); Ann Arbor garden (in operation); Indiana State University (contemplated); and San Francisco garden (active work begun). It might be suggested that the New York garden investigate and develop the resources of the southeastern United States, West Indies and parts of South America; the St. Louis gardens, the Central States, the southern United States, Mexico and South America; Philadelphia, the northeastern United States, southern Europe, India and Asia; Ann Arbor, the northern United States

Canada and northern Europe; the Indiana gardens, the Central States and the Northwest, including Alaska; the San Francisco gardens, the Pacific States and the Orient, including the Philippine Islands. These are mere suggestions based upon a co-operative idea. The Department of Agriculture would no doubt be willing to co-operate in maturing such plans.

(*e*) These gardens should maintain adequate laboratories of chemistry, pharmacy, pharmacology and botany for research work. For this purpose the laboratories of colleges of medicine and pharmacy as well as those of experimental stations, of manufacturing chemists and pharmacists would be available.

(*f*) The gardens should maintain herbaria and a museum of pharmacy and medicine for the instruction of students and the edification of the public in general. The museum should contain a suitably arranged exhibit of vegetable drugs and their derivatives, mineral drugs, pharmaceutical preparations, apparatus and equipment used in collecting, preparing, drying, garbling, packing, storing and shipping vegetable drugs; in fact, everything of interest bearing on pharmacy and medicine. The herbarium should contain carefully determined specimens of all plants of medicinal value and related plants. It need scarcely be stated that a fairly complete working library is also an essential to such gardens.

IV. PLANTS TO BE GROWN.

Dr. Rodney H. True, of the United States Department of Agriculture, who is in charge of Drug and Medicinal Plant Investigations, in a recent communication made the following statement: "I would suggest the desirability of cultivating small plots of a large number of species of plants having medicinal properties. (The Government has published nothing so far regarding the cultivation of drug plants, apart from a brief outline covering the general plans.) From our standpoint, the larger the number of drug plants experimented with the better." In this the writer heartily concurs. The following plants should be grown in so far as that is possible: The official medicinal plants of all countries; important unofficial medicinal plants; plants reported to have medicinal value, as those used by savages of various countries, and popular "medicinal herbs" not yet known to the science of medicine and pharmacy; plants extensively used as adulterants or sub-

stitutes of medicinal plants; plants having no medicinal value but used in medical and pharmaceutical practice. Enough of each species should be grown to supply the requirements of the various gardens.

V. GROUPING OF PLANTS.

This is a matter of greater importance than would appear on first consideration. A grouping according to natural orders or according to physiological action or constituents is not natural, and to make such grouping in a measure successful, entails extra labor and expense and the scheme cannot be carried out consistently or completely in many instances. A more rational plan would be to group them ecologically, that is, according to the natural requirements and conditions of soil, light, moisture and temperature. According to such a plan, the following would be a brief tentative outline of the groups:

Group I.—Trees and woody climbers (as grape, ivy, poison ivy), including those herbs and shrubs which require shade (forest and woodland shrubs and herbs).

Group II.—Shrubs; beginning with the larger tree-like forms (dogwood, spiræa, etc.), grading off with smaller shrubs (blackberries, etc.).

Group III.—Herbaceous plants and small shrubby plants which do not require shade. These may again be separated into subgroups according to nature of soil, water required, climbing herbs, runners, smaller herbs and large succulent herbs, etc. This group would consist largely of annuals and biennials and is the largest and most important group.

Group IV.—Water plants, that is, such as are wholly or partially snbmerged below the surface of the water. These are to be grown in artificial ponds when necessary.

Group V.—Bog or marsh plants, such as require very wet soil. These for the most part also require more or less shading.

Group VI.—Xerophytic or dry-soil plants. They require comparatively dry sandy soil with good drainage and plenty of sunlight. They are mostly of tropical or sub-tropical origin, and must be grown in well-protected areas or in hothouses.

Group VII—Tropical plants. These must for the greater part be grown in hothouses.

It is hoped that these suggestions may be of some practical ben-

efit. In conclusion, it may be stated that active work has been begun on the San Francisco Garden of Medicinal Plants. About eight acres of ground in Golden Gate Park are set aside; some 400 or 500 different species of medicinal plants will be seeded or planted in January, 1904, and additions will be made as rapidly as possible.

CALIFORNIA COLLEGE OF PHARMACY,
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MAKING OF COMPRESSED TABLETS.

BY GEORGE B. WEIDEMANN.

If a pharmacist wishes to manufacture compressed tablets and triturates he can do so very economically, as the apparatus necessary for such work will be found in every drug store, with the exception of the machine, and its purchase is his only real expense.

The preparation of the material to be compressed is the most difficult part of the work, for each substance has its own peculiarity and must be treated in a little different manner, but the general plan of procedure is the same.

The ingredients must first be reduced to a very fine powder, granulated, dried and lubricated before it is ready to compress.

After thoroughly mixing the powder, to granulate, water, dilute alcohol, or a mixture of syrup and water, are the substances usually employed, but water makes a firmer granule, which is less liable to disintegrate in handling.

The powder is moistened until it has the consistency of dough and is then forced through a No. 16 or No. 20 sieve and dried. For a small tablet or triturate a No. 20 sieve is better, but for larger tablets a No. 16 sieve is used.

To facilitate drying, a drying oven may be used, but this is not necessary, for if spread on paper in a dry place the granules will dry very quickly; but, if this method is employed, a piece of paper should be laid over the material to keep out particles of dust.

After the material is thoroughly dry, it is lubricated, and for this several substances are used. The manufacturers spray the granules with liquid petrolatum, using 10 or 12 drops to the pound, and about 2 per cent. of talcum is added to prevent the material from adhering to the dies; but I have found this very unsatisfactory, for if only a few drops too much of liquid petrolatum are added the

material will not compress, and to eliminate this possibility of failure, I use French chalk entirely and have been successful in all instances.

The material is now ready to compress. The tablet should not be made too hard or it will not disintegrate when swallowed, but it must be made sufficiently hard to prevent disintegration in handling. To facilitate solubility a small quantity of an inert powder is added to the ingredients and a mixture of sugar of milk 5 parts and cane sugar 1 part is usually added.

With a Stokes machine it is possible to compress about 100 tablets a minute, as one revolution of the wheel completes the tablet.

Quite a few substances can be compressed without any preparation, as the material comes from the manufacturer granulated. To this class belong such chemicals as salol, ammonium chloride, bromides, iodides and chlorate of potash.

Triturates, such as strychnia and its salts, corrosive sublimate, calomel, calcium sulphide and arsenous acid, can be made at a cost of from 2 to 4 cents a thousand (labor not being accounted for), while the manufacturer will charge from 35 to 50 cents for a like quantity. All tablets can be made for from 10 to 40 per cent. of what they cost to purchase them from the jobbing-house, excepting such tablets as chlorate of potash and ammonium chloride, which can be bought for a slight advance of the drug itself, and hence it would not pay one to make them.

If a pharmacist puts up headache tablets, cold tablets, or voice lozenges, he can save about 75 per cent. by making them himself, as the manufacturers charge more proportionately for special formulas than for their regular listed ones.

Some tablets can be made by like methods, but quite a few require special manipulation.

Sodium salicylate, for instance, should be granulated with a gum, and syrup of acacia is often employed.

Quinine sulphate requires the addition of 5 per cent. powdered acacia and 10 per cent. powdered cane sugar, or else it will not compress.

Many others require special manipulation which can only be learned by experience with the drug itself.

BIOGRAPHICAL SKETCHES.[1]

By M. I. Wilbert.

DR. DAVID B. TRIMBLE.

At a meeting of the Philadelphia College of Pharmacy that was held on March 25, 1834, the Board of Trustees reported that they had conferred the degree of Graduate in Pharmacy on nine candidates who had duly complied with all the requisitions of the College. The first name on the list, as reported (A.J.P., 1834, page 255), was that of David B. Trimble, the subject of this sketch, who for a number of years was the oldest living graduate of the college. David Brown Trimble was born in the city of Baltimore on May 29, 1813. As a young man he came to Philadelphia with his brother Joseph, and both of them subsequently entered the Philadelphia College of Pharmacy as students, graduating together in the same year. As a student in the Philadelphia College, David B. Trimble had the very great advantage of having as instructors two of the greatest teachers of Materia Medica and Chemistry that this country has ever seen. These proficient teachers, Dr. George B. Wood and Dr. Franklin Bache, had at that time already established for themselves a reputation for ability and thoroughness in their chosen departments that, soon after, brought to them ample honors and liberal compensation in more elaborate fields of labor.

When we consider the mental caliber of these early teachers in a school of pharmacy, it need not surprise us to find that the students who came in contact with them, developed in after life traits that readily distinguished them from the average of their fellow workers in the same field.

As noted before, it was from this school that David B. Trimble graduated in 1834, the subject of his thesis being "Colchicum Autumnale." After graduating at the Philadelphia College of Pharmacy David B. Trimble entered the Jefferson Medical College as a student. Here he graduated in the spring of 1837, having successfully passed the required examination and presented a thesis on "Scrofula."

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[1] This is the third paper of a series of biographical sketches being prepared by Mr. Wilbert. Sketches of Alfred B. Taylor and Maurice W. Alexander appeared in the March, 1903, number of this Journal, and a sketch of Professor Maisch in the August number.

Dr. Trimble began the practice of medicine in Cecil County, Md. He was married, on November 5, 1840, to Elizabeth Trimble Asken, at East Nottingham Meeting, Md.

Dr. Trimble appears to have been imbued with the roving spirit that was so prevalent among native-born Americans in the first half of the nineteenth century. We find him practising medicine in Burlington, N. J., Marlton, N. J., and finally in Beverly, N. J., where he was well known and is still remembered by a number of the older residents. About 1864, he removed to Chicago, Ill., where he became acquainted with a fellow alumnus of the college, Mr. A. E. Ebert, who at that time was actively interested in the Chicago College of Pharmacy, being the corresponding secretary and chairman of the committee on the School of Pharmacy. In 1872, at the suggestion of Mr. Ebert, Dr. Trimble was offered, and accepted, the chair of Materia Medica and Toxicology, in the Chicago College of Pharmacy. This chair he occupied for three seasons, or until the spring of 1875, when he resigned. Shortly after this he removed to Evanston, Ill., where he practised medicine for some years. He later removed to Geneva Lake, Wis. Feeling that he had spent his more active years, Dr. Trimble retired from the practice of medicine and removed to Starke, Bradford County, Fla. The remaining years of his life were spent quietly between Starke, Fla., and Philadelphia. During this later period he spent some time in Philadelphia and cultivated quite a circle of acquaintances, who were charmed by his interesting and genial personality and who still recall with pleasure the interesting reminiscences of travel and adventure with which he was wont to entertain them.

Dr. Trimble died at Fernandina, Fla., September 4, 1901, having reached the eighty-ninth year of his age. Of the eight children that had been born to him, but three survived—Mrs. Harry Swinburne of New York, Mr. John J. Trimble, of Danville, Ill., and Mr. Henry P. Trimble, of Fernandina, Fla. To these the writer is indebted for many of the facts and data included in the above sketch.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Quantitative Chemical Analysis. By the late C. Remigius Fresenius. Authorized translation of the greatly amplified and revised sixth German edition, by Alfred I. Cohn. 2 vols., 8vo, 2,076 pages, 280 figures. Cloth, $12.50.

As a result of the interest in analytical chemistry, new methods of analysis are quite numerous, and improvements of older methods are continually being suggested. It is becoming more and more apparent that while quantitative analysis is based upon certain basic principles, as understanding the "properties of precipitates," and the insidious causes of error are being eliminated, nevertheless there is a personal element that enters into the work which influences, in a measure, the result of different workers. Uniform methods of analysis are being encouraged, and as time goes on there will be more disposition for the adoption of uniform methods as are at present carried out by the agricultural chemists.

Many books on quantitative analysis have appeared. Some of these have excellent features which commend them. We have not, however, seen a book on this subject which may be considered to be so complete and so essential to the analyst as the present revision of Fresenius. It is so full of methods and references to the important literature that one almost wonders that it has been possible for a single individual to write a work containing so many of the results of the latest researches in analytical chemistry, including methods for both inorganic and organic substances.

A brief summary of the more important subjects treated of in this work is as follows: determination of quantity and measuring; preparation of substances for the processes of quantitative analysis; general procedure in quantitative analysis; reagents; forms and combinations in which substances are separated from each other, or in which their weight is determined, including basic radicals and acids; determination of basic radicals and the estimation of acids; qualitative examination of organic substances; determination of the elements in organic substances; determination of the equivalent of organic compounds; calculation of the constituents sought from the compound obtained in the analytical process and conversion of the result in percents; deduction of empirical and rational formulas; calculation of the vapor density of volatile substances; analysis

of water; analysis of some technical products and minerals, with processes for determining their commercial value; determination of sugars, starch, dextrin, alcohol and tannin; estimation of anthracene; estimation of the inorganic constituents of plants; analysis of soils, manures and atmospheric air; official methods of analysis adopted by the Association of Official Agricultural Chemists; some principles and methods of rock analysis; tables for the calculation of analyses.

The work is to be commended to all analysts, and will be consulted for years to come, as it has in the past, as an authoritative work of reference.

A Dictionary of Medical Science. Containing a full explanation of the various subjects and terms of Anatomy, Physiology, Medical Chemistry, Pharmacy, Pharmacology, Therapeutics, Medicine, Hygiene, Dietetics, Bacteriology, Pathology, Surgery, Ophthalmology, Otology, Laryngology, Dermatology, Gynecology, Obstetrics, Pediatrics, Medical Jurisprudence, Dentistry, Veterinary Science, etc. By Robley Dunglison, M.D., LL.D., Late Professor of Institutes of Medicine in the Jefferson Medical College of Philadelphia. New (twenty-third) edition, thoroughly revised, with the pronunciation, accentuation and derivation of the terms, by Thomas L. Stedman, A.M., M.D., Member of the New York Academy of Medicine. In one magnificent imperial octavo volume of 1,224 pages, with about 600 illustrations, including 85 full-page plates, mostly in colors, with thumb-letter index. Cloth, $8.00, net; leather, $9.00, net; half morocco, $9.50, net. Lea Brothers & Co., Philadelphia and New York.

The present edition is the twenty-third during seventy-five years. This speaks well for the original author as well as publishers and those connected with the later revisions, as it is almost impossible to prevent the fossilization of dictionaries and encyclopedias. Dunglison in his earliest work made it clear that the dictionary which he had in mind was to be not merely a lexicon or dictionary of terms, nor a work which was to contain a bald definition or array of synonyms, but there must be an illumination of the subject so that each word must have, in addition to definition, some indication of its relationship to various departments of medicine. The result has been a work which has proven to be almost indispensable to students and practitioners. In the present edition numerous illustrations

have been introduced, as of blood-cells, urinary sediments, methods of bandaging, parts of the human body, microorganisms, etc.

ESSENTIALS OF VOLUMETRIC ANALYSIS. An introduction to the subject, adapted to the needs of students of pharmaceutical chemistry. Embracing the subjects of Alkalimetry, Acidimetry, Precipitation Analysis, Oxidimetry, Indirect Oxidation, Iodometry, Assay Processes for Drugs, Estimation of Alkaloids, Carbolic Acid, Sugars, Theory, Application and Description of Indicators. By Henry W. Schimpf, Ph.G., M.D., Professor of Analytical Chemistry in the Brooklyn College of Pharmacy. Illustrated. 12mo, vii + 227 pages, 38 figures. Cloth, $1.25. New York: John Wiley & Sons. London: Chapman & Hall, Limited. 1903.

Volumetric analysis, like the study of organic chemistry, has an unmistakable charm for the careful student, because chemical themes and laws are continually brought into play and accurate results are assured. The author of the present volume has made an excellent reputation as an author of a valuable text-book of volumetric analysis and the present work has apparently been prepared to popularize this subject.

The subject-matter is systematically arranged as far as can be, and treated as concisely as is consistent with clearness of expression. The processes are grouped under five headings: Neutralization, Precipitation, Oxidation, Indirect Oxidation, and Iodometry. The principles underlying each group are definitely indicated, and their application illustrated by numerous practical examples. Other subjects treated include methods of calibration and of the accurate reading of graduated instruments, the calculation of the results of analyses, the preparation and standardization of volumetric solutions. The indicators, their selection for special cases and the ionic theory regarding their action, as well as assay processes for phenol, sugars and vegetable drugs, also receive special treatment.

The book is to be commended to students and others interested in volumetric analysis and ought to be in the hands of every pharmacist in the United States. We need more books on advanced pharmacy which are written as clearly as this one and with so much interest and profit to the pharmacist.

OBITUARY.

DR. H. M. ALEXANDER.

Dr. H. M. Alexander, who had achieved a national reputation as a propagator of vaccine virus, died at his summer residence at Conewango, Pa., on October 13, 1903, after a short illness from angina pectoris.

H. M. Alexander was born at Lewisburg, Union County, Pa., May 17, 1851. He graduated from Bucknell University in 1873, and then took up the study of medicine, graduating from the University of Pennsylvania in 1876. After spending a short time in the hospitals studying and obtaining experience, he located at Marietta, Pa., and engaged in the practice of his profession. He soon won the confidence of the people and became popular and enjoyed a handsome practice. He was esteemed as one of the most enterprising and upright citizens of the county.

Dr. Alexander became interested in the subject of vaccination and the propagation of bovine virus which had been introduced into the United States by Dr. Henry A. Martin in 1870. He made a careful study of the best methods and the proper conditions and surroundings necessary to insure the production of safe and reliable vaccine. He fully recognized the importance of the subject and was convinced that all establishments for this purpose should be located in the open country, where pure air, perfect cleanliness and the best sanitary conditions can be attained.

In 1882, he established his laboratory and vaccine farm at Marietta, in the rich and fertile county of Lancaster, in what has been considered an ideal spot. This farm was looked upon as a model, and Dr. Robert L. Pitfield in his report on the inspection of vaccine farms made to the Pennsylvania Board of Health commented upon it as "an admirable establishment in every particular." It was as proprietor of the Lancaster County Vaccine Farm that Dr. Alexander was best known and gained a national reputation and a business that was international. He was an enthusiastic stu lent of the subject and an energetic business man, and his efforts met with deserved success, and under his personal supervision his biological laboratories developed into an important industry.

The occurrence of epidemics of smallpox, necessitated the providing of facilities for turning out at such times of enomorus quan-

tities of virus, and in order to meet such demands, in 1886 he established a branch laboratory at Omaha, Neb., and as an additional precautionary measure a supplemental plant was erected in 1894 on a farm near McEwensville, in Northumberland County, Pa. In 1889, Dr. Alexander decided to relinquish the practice of medicine and devote his entire time to the extensive business. Subsequently the style of the firm was changed to Dr. H. M. Alexander & Co., and quite recently extensive improvements were made in the Marietta laboratories and a department established for the manufacture of antidiphtheritic serum.

Dr. H. M. Alexander was an active member of the Lancaster City and County Medical Societies and a contributor to their proceedings. He was also a member of the Pennsylvania State Medical Association and attended their recent meeting in September at York, Pa. The day following his return from this convention he was taken ill, but appeared to be improving until overcome by a sudden attack of angina.

Dr. H. M. Alexander was married in 1877 to Miss Martha Woolman, of Philadelphia. She and six children survive him.

G. M. B.

BARNARD SIMPSON PROCTOR.

By the death of Barnard Simpson Proctor, F.I.C., in September last, British pharmacy lost one of its most able and honored exponents.

Yet, notwithstanding the distinction won by Mr. Proctor as a pharmaceutical chemist, teacher and writer, his life may be said to have been one long protest against the fate that made him a pharmacist. As a boy, he had a taste for mechanics and physics, and his desire was to become an optician and philosophical instrument maker. In an appreciation of him, the editor of the *Chemist and Druggist* says: "Proctor ought never to have been behind the counter. It is good for pharmacy that he was; but his abilities and his philosophic mind would have ensured for him high rank in pure science."

Mr. Proctor was born at Newcastle-on-Tyne in 1829, and was the fifth in line of five generations of chemists. After passing his major examination in 1853 he entered into partnership with his father, the late William Proctor, pharmaceutical chemist, it being the desire of his father that he be a druggist and chemist, and con-

tinued in business until 1897, when he retired. He became a member of the Pharmaceutical Society in 1857, and was later, in 1863, one of the founders of the British Pharmaceutical Conference, being also the author of the first paper presented to this body. In 1869 he was appointed lecturer on pharmacy at the College of Medicine of Durham University, being the first English pharmacist to hold a university chair. His lectures at the University were embodied in his book, "Lectures on Practical Pharmacy," published some thirty years ago. Mr. Proctor had devoted considerable of his time to simplifying the tests for purity, and in 1891 these were published under the rather characteristic title, "A Manual of Pharmaceutical Testing for the Man of Business and His Assistant." As an example of his thoroughness, it may be cited that in his last paper to the British Pharmaceutical Conference, in 1894, which was on Rhubarb, were recorded the results of twenty-six years of experimenting.

In addition to his accomplishments in the science and art of pharmacy, Mr. Proctor was a power with his pen, and was regarded as being at one time the first of controversialists in English pharmacy. The number of papers published by him were legion, and it is said that "his interest in pharmaceutical politics was keen to the last."

Mr. Proctor's personal qualities were such as to endear him to those who knew him best, being of even temper, warm-hearted, and just. In this connection it is interesting to note that he could never be prevailed upon to accept the offers of the presidency of the British Pharmaceutical Conference, nor would he accept the honorary degree of M.A. from Durham University, claiming that an arts degree was not suitable for him, and at that time the University did not bestow scientific degrees.

The last year of Mr. Proctor's life was spent at Westbury-on-Trym. Mrs. Proctor, who is a niece of Michael Faraday, and two sons and two daughters survive him. F. Y.

CHICAGO COLLEGE OF PHARMACY.

The Alumni Club of the Chicago College of Pharmacy held its second monthly meeting of the season, at the rooms of the Chicago Drug Trade Club, on the evening of November 4th. Mr. L. I. Schreiner presided.

The feature of the evening was the review of current pharmaceutical literature by members of the club. Mr. G. A. Brenke reviewed the *American Druggist* for October 28th. A discussion on the preservation of Syrup of Hydriodic Acid was followed by a proposition to increase the strength of this official syrup to 5 per cent. Professor Hallberg thought such an increase desirable, in that it would provide a suitable substitute for the alkaline iodides. Mr. Thorburn doubted the desirability of such a substitution from a therapeutic standpoint, and suggested that iodides of an organic base would be preferable. A lively discussion followed the presentation of the salient features of the Patent Commissioners' report on the petition of the committee chosen by the N.A.R.D. to confer with the President. Professor Hallberg was appointed a committee of one to draft resolutions expressing the sentiment of the club on this question for presentation at the next meeting.

Professor Day reviewed the leading articles in the AMERICAN JOURNAL OF PHARMACY for October, especially Professor Schlotterbeck's paper on "The Mydriatic Alkaloids."

Mr. Thorburn reviewed the October number of the *Druggists Circular.* The greatest interest was manifested in the editorial entitled "A Menace to the Pharmacopœia." Professor Hallberg spoke of the proposition to make a general statement in the *Pharmacopœia* to the effect that the official requirements applied to the articles in the U.S.P. only when used for medicinal purposes; and also of the elimination of the common names, such as "Sweet Spirit of Nitre," etc. Mr. Hereth, Mr. Schreiner and others took part in the discussion.

The correctness of the statement of Dr. Wiley, in his address before the N.A.R.D., in Washington, D.C., recently, as reported in the journals, that the Federal Government does not concern itself as to the quality of drugs imported, only as to the duty to be collected, was challenged by Professor Hallberg, who said that instead of its being a matter of indifference whether opium, for example, contains 5, 10 or 20 per cent. morphine, the customs law levies a duty of $6.00 a pound on opium containing less than 9 per cent. of morphine and opium prepared for smoking, while opium containing not less than 9 per cent. morphine is subject to a duty of $1.00 per pound; thus opium which falls below the U.S.P. standard is excluded from the drug market in the United States.

Several other journals were to have been reviewed, but the members who had agreed to take them were unable to be present.

Mr. Snow was appointed to arrange for the next meeting of the club, to be held at the same hour and place on December 2d.

At the December meeting, Mr. C. N. Snow presided. The report of the committee appointed at the preceding meeting to draft resolutions regarding the decision of Patent-Commissioner Allen in the case of the protest made by the committee of the National Association of Retail Druggists was received, and the resolutions reported were unanimously adopted. The chairman was instructed to send copies of the resolutions to each Congressman and Senator from Illinois, as well as to the President. The following is a copy of the resolutions:

WHEREAS, The interests of legitimate medicine are seriously injured and threatened through the operation of the patent laws of the United States, under which patents may be obtained not only on the process of manufacture, but on the finished product, and

WHEREAS, Protection in the process of manufacture is amply sufficient to stimulate inventive genius, and promote in the highest degree adequate reward for the talent and labor employed in the discovery of remedial agents, and

WHEREAS, Protection in the patent of the product inevitably tends to discourage inventive genius in the discovery of improved methods of manufacture tending to higher qualities and increased efficiency in remedial agents, and

WHEREAS, The laws of other nations, notably those of Germany, recognize no right of patent in the finished product, but wisely and equitably limit such protection to original processes of manufacture, and

WHEREAS, Under existing treaties between the United States and foreign nations the citizens of such foreign nations are given all the privileges enjoyed by the citizens of the United States, thus supplying them with a degree of protection not accorded them under their own government, and which tends to grievous extortion in the sale of such foreign products in the United States, and to the establishment of merciless monopolies, therefore be it

Resolved, That we denounce the defense of such discriminating legislation by Commissioner of Patents Allen as opposed to the dictates of justice, to the rights of domestic inventors, and to the interests of American manufacturers and of retail pharmacists in every State, and be it further

Resolved, That we favor a renewed appeal to the President of the United States, invoking his aid in such revision of existing treaties with foreign nations as shall extend to foreign manufacturers in this country such privileges only as they respectively enjoy in their own country, and as American manufacturers and American inventors enjoy in such country. We also ask the Congress to so revise the patent laws of the United States as shall permit protection in the process of manufacture only, and not in the product.

Mr. Frank E. Fisk reviewed the November number of *Merck's Report.* Considerable discussion was had on the extemporaneous preparation of absolute alcohol from strong alcohol. Mr. Thorburn reported that he had frequently tried the method of using dried copper sulphate, and had failed to get an alcohol stronger than 97 per cent. He had found that lime freshly ignited gave better results.

Mr. W. D. Brenke reviewed the *Western Druggist* for November. With regard to the formula for syrup of calcium lacto-phosphate proposed by C. H. LaWall, Professor Hallberg stated that the plan of using the concentrated solution of the lacto-phosphate was an excellent one, and would apply not only to this syrup, but to other similar syrups.

Professor Day gave an abstract of the original papers appearing in the AMERICAN JOURNAL OF PHARMACY for November.

Mr. Sheblessy reviewed the *American Druggist.* In reply to a question concerning the practice of druggists in lending clinical thermometers to patrons, Mr. Sheblessy stated that the practice was a common one in his neighborhood, and would be difficult to do away with, except by the united action of the druggists of each district.

Mr. A. D. Thorburn commented on the articles presented in the November number of the *Druggists Circular.* In connection with the editorial "The Doctor's Duty," he stated that he had information, which he deemed reliable, to the effect that a "phenacetin crusade" would soon be inaugurated in Chicago.

Professor Hallberg reported on the *Journal of the American Medical Association*, summarizing three papers on pharmacology read before the section on materia medica, pharmacy and therapeutics, viz.: "Is Pharmacologic Action Determined by Chemical Structure or by Physical Characters?" by A. R. Cushny; "The Relations Between the Pharmacologic Actions of Drugs and Their Therapeutic Indications," by M. V. Tyrode; and "Research Problems of Pharmacology," by Torald Sollmann. The papers which appeared during the month of November were of unusual interest to pharmacists, especially the suggestions of Dr. Sollmann, relating to research, that a central laboratory should be established which could supervise and correlate the work of independent investigators. In that way only can the physiologic action of drugs on animals be compared with clinical observations, and the best therapeutic deductions be drawn.

PHILADELPHIA COLLEGE OF PHARMACY.

HISTORICAL COMMITTEE.[1]

In accordance with the recommendation contained in the annual address of our President, Mr. Howard B. French, the undersigned were appointed as "The Historical Committee."

The early apothecaries of Philadelphia were assiduous workers in developing the scientific thought and tendencies of their day, and many were equally prominent in social positions and likewise active in professional and commercial interests. No small amount of credit is due to them for the prominent part they took in laying the foundations of a number of successful educational and charitable institutions, and the marked influence they exerted in the establishment of prominent retail and wholesale drug stores, pharmaceutical manufactories, and chemical industries. The drug trade has kept pace with the progress and development of this modern city and has furnished a number of noted examples of individual energy and success.

The Philadelphia College of Pharmacy stands as a central figure around which are clustered many prominent persons, and interwoven and associated more or less closely with her history are the interesting experiences of many whose lives have been devoted to building up enterprises connected with pharmaceutical, chemical, and other industries. Her growth and development is an important part of the history of Pharmacy.

These older pharmacists have mostly passed away and much interesting historical data has undoubtedly been lost, but a few of their associates and acquaintances are left and they should at once record their recollections of the past and the reminiscences connected with these associations.

We believe that this is the first organized systematic effort that has been made to obtain this information, which must be of more than local import, and it becomes the duty of this committee to collate, compile, record and permanently preserve all such interesting and valuable matter.

It is the desire of the Historical Committee to make these records

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[1] Members of Committee: George M. Beringer, Chairman, 501 Federal Street, Camden, N. J.; William J. Jenks; Prof. Henry Kraemer; Jacob M. Baer; and M. I. Wilbert, Secretary, German Hospital, Girard and Corinthian Aves., Philadelphia, Pa.; Howard B. French, ex-officio.

as complete and thorough as possible. We want to obtain all the available data relating to individual experiences and life histories, to trace the growth and development of modern pharmacies and wholesale drug establishments, the manufacturers of pharmaceuticals and chemicals and the allied industries.

This letter is our personal appeal for assistance to any one possessing knowledge relating to these old-time apothecaries, the trade conditions and customs of their days, the stores, the life works, habits, associates, scientific, political and social attainments, etc. It is directed to relatives and friends as well as to their pharmaceutical associates and *your co-operation is earnestly solicited.*

Will you please promptly write the Chairman or Secretary, giving such information as possible, and loan the Committee any printed or written data that you may have? These communications should be replete with personal reminiscences, anecdotes and experiences, and what may appear to you as only fragmentary notes may be of value to the Committee as confirming and adding to information from other sources.

It has been proposed that this Committee should also prepare a complete catalogue of the graduates of the Philadelphia College of Pharmacy, setting forth after each name the date of birth, the class date, the address, business location and career, politic and scientific honors attained, etc. While this will greatly extend the labors of this Committee the completion of such a list will be of great interest to the Alumni and a permanent record of value to the College. Will every living graduate favor us with replies to the enclosed queries and information regarding those who are deceased.

The College already possesses a number of historic relics and souvenirs and it is now proposed to establish in its museum a section devoted to the exhibition and preservation of such materials as obsolete drugs, preparations, utensils, apparatus, shop furniture, books, papers, diplomas, medals, tickets, portraits, etc., associated with pharmaceutical history. May we hope that this permanent exhibit will receive your support and that you will donate any such historic material in your possession?

We ask your careful consideration of the enclosed and a prompt reply.

Please answer the following queries and supply any additional information or detailed statements possible and mail promptly to The Historical Committee,

Philadelphia College of Pharmacy. If the space allotted on this sheet is not sufficient to contain all the information you can give, then kindly write such replies on other sheets; you can't supply too much.

1. Name.
2. Address.
3. Give present business.
4. Give date and place of birth.
5. During what years did you attend lectures at the P.C.P.?
6. Who were the teachers at the time?
7. Give any interesting experiences as a student.
8. What year did you graduate?
9. Give title of thesis.
10. Give any information regarding your early life, education, and personal history you care to supply.
11. What classmates have had specially noteworthy careers?
12. In what stores were you employed?
13. Give your business associations and career since graduation.
14. What political, educational or social positions have you held?
15. What educational or honorary degrees have been conferred upon you?
16. What organizations are you a member of?
17. Who were the prominent pharmacists in your locality?
18. Give in detail any peculiarities of these druggists, their habits, associates, stores, fixtures, customs of the time and place, style of trade, character of customers, etc.
19. Have you any pictures of these old pharmacists or their stores?
20. Have you any printed or written matter relating to same?
21. What anecdotes or reminiscences of this period can you tell?
22. What relics or souvenirs associated with these older druggists or pharmaceutical history do you own?
23. Do you desire to donate any such relics or records to the Historic Section of the Museum for permanent preservation?
24. Do you know of any one possessing such relics or souvenirs?
25. Can you give the Committee the address of any persons possessing information or records relating to these subjects of pharmaceutical history?

PHARMACEUTICAL MEETING.

The stated pharmaceutical meeting of the Philadelphia College of Pharmacy was held on Tuesday afternoon, December 15th, with Prof. Samuel P. Sadtler in the chair. The meeting was an especially interesting one and well attended.

Prof. John Uri Lloyd, of Cincinnati, who is well known as an author not only of scientific books but of fiction, especially folklore studies of Kentucky, was the first speaker introduced, and gave an address on the "History of the Eclectic Resinoids and Their Termi-

nology." The address was largely historical and devoted in the main to the nomenclature of the alkaloids, resins and similar principles introduced into medicine during the first half of the last century. Professor Lloyd was fortunate in having an intimate acquaintanceship with Prof. John King and others who were instrumental in introducing these substances into medicine, and he stated that inasmuch as the history of these circumstances is fast passing away he was glad to be able to give the facts to the Philadelphia College of Pharmacy for record. Professor King aimed to formulate a plan that would accord with rule and in which the eclectic concentrations, as they were called, should be properly differentiated from the alkaloids that were then beginning to attract attention. He first called these eclectic concentrations "resins," and then, when the demand was for a single word to describe them, as podophyllin for resin of podophyllum, the termination "*in*" was adopted to distinguish these preparations from the alkaloids, which had the affix "*ia*," "*ine*" or "*ina*."

Professor Remington expressed his appreciation to Professor Lloyd for having cleared up this subject and said that he had honored the Philadelphia College of Pharmacy by giving this valuable paper here. He then exhibited some specimens of the eclectic concentrations which formerly belonged to Professor Procter, some of these having been prepared by Prof. Edward S. Wayne. He said that the subject of nomenclature was an important one and that druggists are oft times confused when they receive a prescription for a resinoid when there is a corresponding alkaloid.

Mr. Wilbert said that fifty years ago the discussion of the eclectic resinoids was a very live question, and referred to an article by Prof. Edward Parrish on "Eclectic Pharmacy," which was published in the AMERICAN JOURNAL OF PHARMACY in 1851 (Vol. xxiii, page 329). In this paper Professor Parrish calls attention to a paper by W. S. Merrill, in which the latter claims to have introduced several eclectic resinoids, viz., those from podophyllum, cimicifuga, sanguinara, leptandra, iris and certain other drugs; and in this connection Professor Parrish calls attention to the fact that John R. Lewis had previously made a study of podophyllum (see AMER. JOUR. PHARM, Vol. xix (1847), page 165). Mr. Wilbert also mentioned the paper by William Hodgson, Jr., which was published in this JOURNAL in 1831 (Vol. iii, page 273).

Evan T. Ellis remarked that Professor Lloyd's paper was exceedingly interesting to him as it cleared up what had been for these many years a misapprehension involving the rectitude of reputable botanic drug houses now in existence—that the admixture of carbonate of magnesia was not a wilful adulteration as he supposed—but was really introduced to facilitate the drying of these resinoids as they were termed.

Mr. Wilbert also stated that in 1850 the Legislature of Pennsylvania granted a charter for an eclectic medical school in this State, which was the second established in the United States. This school was located at Sixth and Callowhill Streets, over H. N. Rittenhouse's drug store. Mr. Rittenhouse was a publisher at that time of the eclectic publications. There seemed to be a little misunderstanding as to who this Mr. Rittenhouse was, and Mr. McIntyre was pretty well convinced that it was not the Mr. H. N. Rittenhouse who is still living and a member of the Publication Committee of this JOURNAL. Since the meeting the latter has informed the Secretary that the Henry Rittenhouse referred to was originally a comb-maker in Kensington; then an eclectic druggist at Sixth and Callowhill Streets, and from there he removed to Seventeenth Street near Ridge Avenue, where he died a few years ago, being quite an old man at the time of his death.

M. I. Wilbert gave an address on "The Early History of Medicine in America," which was illustrated with a large number of excellent lantern-slides, among these being photographs of distinguished medical men of that time (see this JOURNAL, page 1). Mr. Wilbert also exhibited a photograph of the old Friends' Almshouse, the grounds of which were used for the cultivation of medicinal plants up until 1840 or 1850.

E. T. Ellis, referring to the old-time Friends' Almshouse, on Walnut Street between Third and Fourth Streets, Philadelphia, mentioned by Mr. Wilbert, and the cultivation of medicinal herbs in the little gardens, said that although the main structure and all the cottages were torn down in the '30's or early '40's, one old Friend was permitted to retain her home and garden until her death in the '60's, viz., Nancy Brewer, who had quite a reputation with Friends and others for her medicinal herbs—supposed to be all grown in her garden. But Nancy, he said, "did draw on us in her last years for the Shaker products—as we had the agency of

the Shaker Society herbs." E. T. Ellis remembers the Friends' Almshouse perfectly, as he was born near it in 1826.

Professor Lloyd said that he was much interested in the address of Mr. Wilbert and remarked that he was sure that there was a thesis in the archives of the University of Pennsylvania on "The Use of Chloroform in Medicine," which antedates any other publication on this subject. He said that the name of John Morgan called to mind the famous Confederate cavalryman of the same name, whose escape from the Columbus penitentiary during the war created such excitement throughout the North. Professor Lloyd said that while the North was mystified by the disappearance of Morgan and whilst large amounts of money were offered for his apprehension, he was being cared for by friends in Stringtown County, Ky. Mr. Boring also commented on the Morgan raid and said that he was with the Pennsylvania regiment which did duty in Kentucky and Tennessee at that time. He thought it was a matter of regret that John Morgan was killed by a Union soldier.

Prof. Albert Schneider, of the California College of Pharmacy, sent a communication on "Gardens of Medicinal Plants," in which he pointed out their value in the progress of medicine and pharmacy, and gave some suggestions as to how they may be established in the United States. (See p. 19.)

Mr. William B. Marshall, of the Smithsonian Institution, Washington, D. C., contributed a comprehensive paper on the "Production and Use of Cocoa."

Prof. Henry Kraemer exhibited some hides or so-called "Ceroons," used for packing Honduras sarsaparilla, which were received from Messrs. Lehn & Fink, New York City; some specimens of ginseng received from Jacob Sutliff, P.D.; a large aquarium presented by Messrs. Whitall, Tatum & Co.; a specimen of Yerba Peckeum presented by Mr. Richard Shoemaker; and specimens of a Hercules beetle and a green tiger beetle which he had received from Luis Javier Guier, P.D., of Cartago, Costa Rica, C. A.

The following provisional programme has been arranged for the next meeting: "Lime Water," by M. I. Wilbert, Ph.M.; "The Manufacture of Thermometers," by Gustavus Pile; "Examination of Commercial Peppers," by James W. Gladhill, A.M., P.D.; "Formulas for Pastes," by Prof. Clement B. Lowe.

HENRY KRAEMER, *Secretary.*

NOTES AND NEWS.

THE HISTORICAL COMMITTEE of the American Pharmaceutical Association has undertaken the collection of the correspondence of such men as Procter, Squibb, Maisch, Rice, and others. Persons who are in possession of letters from these men or of other representative men of American pharmacy and who are willing to have them deposited in the archives of the American Pharmaceutical Association, are requested to send them to the committee in order that they may be properly mounted, classified, and bound.

The committee has secured both paper and covers of standard size, so that the volumes of correspondence will constitute a uniform library when completed. Persons who are willing to aid in this work by collecting the correspondence of any one man who has rendered conspicuous service to American pharmacy in his day, should apply to the chairman for standard paper and covers. The committee hopes to make a creditable showing at the Kansas City meeting next summer.

Letters may be sent to one of the following persons or to the chairman, Ed. Kremers, Madison, Wis.; Procter letters to A. E. Ebert, Chicago; Maisch letters to M. I. Wilbert, Philadelphia; Rice letters to Miss Adelaide Rudolph, Case Library, Caxton Building, Cleveland, O.

SOCIETIES OF WOMEN PHARMACISTS.—During the early part of the year the Woman's Pharmaceutical Association was organized in Chicago with the following officers: President, Miss Nina C. Piper; Vice-Presidents, Miss Julia Runkel, Miss Jean Gordon; Secretary and Treasurer, Miss Charlotte Stimson; Committee on Membership, Misses Mary Walker, Amanda W. Stahl, Olive Pierce. This organization aims to be national or even international in its scope.

A month or so ago the "Society of Women Pharmacists and Chemists of Pennsylvania" was organized here in Philadelphia with officers as follows: Honorary President, Susan Hayhurst, M.D., Ph.G.; President, Susannah G. Haydock, Ph.G.; Vice-President, Bertha L. DeGraffe-Peacock, Ph.G.; Secretary-Treasurer, Mabelle Haydock, P.D., B.P. While not the first woman to engage in the practice of pharmacy in the United States, Dr. Hayhurst is held in grateful esteem by a large number of women pharmacists, to whom she has given an opportunity of obtaining practical experience in the Dispensary at the Woman's Hospital.

THE PHARMACEUTICAL EXAMINING BOARD of Pennsylvania have arranged for a practical laboratory examination to be given in addition to the usual written one on January 16, 1904.

They have been enabled through the courtesy of the Board of Trustees of the Philadelphia College of Pharmacy to secure the use of the Pharmaceutical Laboratory for the practical work in the morning of the date set, as well as the class-rooms for the written examination to be held in the afternoon of the same date.

The laboratory work will consist of prescriptions to be prepared by each applicant and is arranged for applicants for the certificate of *Registered Pharmacist* only, the applicants for Q. A. certificates will receive the usual written examination to be held in the afternoon.

Those intending to come before the Board for the Registered Pharmacist certificate should apply to the Secretary, Dr. Charles T. George, Harrisburg, Pa., at least ten days previous, to receive a blank and assignment of time for the laboratory work.

JAMES T. SHINN, Treasurer of the Philadelphia College of Pharmacy, has for a number of years been interested in educational and philanthropic work in this city. He is chairman of the committee of management of Association Local Centre of the American Society for the Extension of University Teaching. This year the Society has the co-operation of the Free Library of Philadelphia, and, in addition to the lectures at the Local Centre, sixty lectures will be delivered at the various branches of the Library. In addition to this, Mr. John Thompson, the Librarian, has had copies of the books especially recommended for reading in connection with the lectures, placed in the reference-room of the Library, at 1217 Chestnut Street, and also in the various branches of the Library in different parts of the city.

Besides being a member of a number of other organizations, Mr. Shinn holds the following offices: President of the Board of Managers of the Society for the Employment and Instruction of the Poor; Secretary of the Pennsylvania Hospital; President of the Vacant Lots Cultivation Society; Vice-President of the Fuel Savings Society.

OTTO A. WALL, Professor of Materia Medica and Pharmacognosy, in the St. Louis College of Pharmacy, was the recipient, on November 14th, of a testimonial commemorating the completion by him of thirty consecutive years of work as a teacher in that institution. The form of testimonial chosen was that of a life-size bronze medallion of Dr. Wall, and the exercises connected with its presentation to the college were held in the Materia Medica Lecture Hall. A duplicate medallion was presented to Dr. Wall's family. The dedication ceremonies were followed by a banquet.

C. S. N. HALLBERG, Professor of Pharmacy in the Chicago College of Pharmacy, delivered an interesting address on "Some Ancient Pharmacists" at the opening exercises of the St. Louis College of Pharmacy, which has been published in recent numbers of *Meyer Brothers' Druggist* and the *Western Druggist*.

J. B. NAGELVOORT has accepted the position of chemist for the Missouri Botanical Garden. Professor Nagelvoort is well known for his researches in phyto-chemistry, and we congratulate him on being so fortunate as to have the facilities of the Shaw Gardens at his disposal.

CHARLES F. CHANDLER, of Columbia University, delivered a lecture illustrated with specimens and diagrams, at the American Philosophical Society on November 7th, on "The Electro-Chemical Industries of Niagara Falls," which was, in fact, a summary of the most remarkable achievements in electrical chemistry of the past twenty-five years, all of which are due to the inventive research of young Americans.

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FEBRUARY, 1904.

THERMOMETERS.

By Gustavus Pile.

The thermometer as an instrument for ascertaining the temperature of various bodies was not given a practical form till less than two hundred years ago, and the people who lived before that time never had the pleasure of knowing how hot or how cold they were, and no one ever spoke of a fall in mercury or a rise in spirits. It seems strange that an instrument like this should for so long a time have escaped the attention of philosophers and thoughtful minds, and even the Chinese, who claim to be the originators of nearly everything worth inventing, quite overlooked it, and it remained for an Italian doctor to first conceive of a method to indicate the temperature of the atmosphere. It was about the beginning of the seventeenth century when a Doctor Santorio, of Padua, from knowing that the addition of heat produced an expansion of air, constructed a very simple affair by which he was enabled to observe the extent of expansion that took place. This instrument consisted of a long tube with a bulb blown on one extremity and left open at the other end. The open end was placed in a vessel containing a colored liquid and the ball heated with a lamp. This caused the air in the ball to expand and partly escape through the open end. When the heat was withdrawn and the air in the ball began to cool, a contraction took place, and the colored liquid rose up in the tube till the expansive force of the air in the ball was the same as the atmospheric pressure on the liquid. There was no scale or marking of any kind attached to this, only the rise and fall of the column being noted.

As such an instrument as this could not conveniently be carried from place to place and having no scale for reference or comparison, it had little practical value; its chief purpose being to draw attention to the subject and open the way for further discoveries. Efforts were soon made to construct something that would be portable and more durable, and as a result, a few years later, an instrument was brought out made somewhat after the manner of the first one, but inverted. A glass ball was blown having an opening at the top through which a glass tube, open at both ends, was inserted and passed down to near the bottom of the ball and under the colored spirits that partly filled the ball. When heat was applied the air in the ball began to expand and the spirits was forced up in the tube. A scale for this followed shortly after, not engraved or marked on the tube, but a few lines were ruled on a piece of wood which was held against the tube when it was desired to read off the height of the column. The top mark on this scale was made to indicate the hottest day in summer and the lowest mark was placed where the column stood when the ball was placed in snow. When the space between the two points was divided into sixty parts, which followed later on, it completed the discovery of the thermometer.

It was only a short time after, somewhere about the middle of the seventeenth century, that thermometers were made having the spirits introduced into a bulb from which all the air was expelled and having the opposite end of the tube sealed over, very much the same as those still in use. The honor of constructing the first mercurial thermometer belongs to Römer, who about 1709 produced an instrument of this kind, only failing to add a scale to make it complete. It was in 1724 that a scale having fixed and definite points for graduation was invented and introduced by Fahrenheit. Taking boiling water to indicate one point and melting ice the other point, he divided the space into 180 equal parts, and this scale applied brought the thermometer to full completion. The object Fahrenheit had in view when he fixed the zero point 32° below freezing is quite unknown and has puzzled many inquiring minds, but when he selected the two points named for the foundation of his scale, he did a very wise thing, for experience has proved them to be the very best that could have been chosen and it will always remain to his credit.

Very fortunately for the thermometer maker, the situation of the

freezing point can be determined with great accuracy, for water containing ice will remain at the same temperature just as long as there remains any ice to be used up, any accession of heat being used in melting the ice. The boiling point of water, however, is not so reliable, but being somewhat changeable its determination is attended with greater difficulty. The density of the atmosphere or barometric pressure has considerable effect upon it; the purity of the water and the nature of the vessel used also produce more or less deviation, and have to be taken into account by the maker who desires to furnish reliable instruments. However, these difficulties can all be overcome, and with proper care and allowances these variations can be corrected. In making a thermometer it is of great importance to select a piece of tubing that has been evenly drawn throughout its entire length. If at any part the bore should be enlarged the column of mercury will become shortened and will register too low, likewise if the bore should be contracted the column will be lengthened and will register too high; hence the great necessity of being sure that the tube has an equal bore at every point. This important fact is determined by introducing a small amount of mercury, just enough to make a short length, say about 2 inches, and then moving it slowly from one end of the tube to the other and measuring it as it travels along. If it remains the same length throughout, the tube is fit for use and is sealed over at the ends for protection against dust and moisture.

Now it must not be supposed that the maker of thermometers goes to all this trouble and time with all the instruments he turns out. Nor is it necessary in all cases, but only when making a standard by which others are compared, as will be hereafter explained. Having selected the proper tubing, a bulb of the required size to hold the mercury is blown on one end. This operation requires considerable skill and practice on the part of the glass blower, for a bulb that is too large will make the scale too extended, and if too small will cause the degrees to be too close together. A bulb also is blown on the other end of the tube for the purpose of filling. By means of a small funnel a sufficient amount of mercury is introduced into the upper bulb. Heat is then applied to the lower bulb to drive out a portion of the air and this, when allowed to cool, becomes partially filled with the mercury. Heat is again applied to the bulb till the mercury boils and is driven out, carrying

with it all traces of air and moisture. On cooling, the mercury is drawn down into the bulb which it completely fills. After standing a while, should any air bubbles appear, the operation has to be repeated, for the presence of air, even in minute quantities, is sure to work mischief. When the thermometer is properly filled the upper bulb is cut off and the tube drawn out to a fine point. It is then placed in a liquid heated to the temperature that its extreme height is to represent, and after all excess of mercury has escaped it is sealed over in the flame, and this completes the thermometer. It has been observed that after being laid aside for a time the column of mercury shows some degree of contraction, which in the course of a year amounts to as much as a degree or two. Hence it is best to lay newly made thermometers aside to season before graduation in order to provide against such changes.

After the requisite time has elapsed, the graduation is accomplished by introducing the thermometer into a vessel of finely broken ice and allowing it to remain till the column of mercury no longer recedes, it is then pointed off by making a nick on the tube with a fine file. The boiling point is ascertained by placing the thermometer in a jacketed vessel which is filled and surrounded with steam supplied by boiling water in the bottom of the inner section. After sufficient time has elapsed to allow the whole to become fully heated, it is pointed off as before and laid aside to cool. The space between these two points is then divided into 180 parts and after being numbered the thermometer is ready for use. As the increase in the volume of mercury is quite uniform in proportion to the heat added, the divisions will be all equal when a perfect tube is used, and this is essential in making a standard instrument. For ordinary thermometers it is not customary to calibrate the tubes, but in order to obtain satisfactory results several intermediate points are taken with the aid of a standard and the required divisions made between them. Generally the points selected are 32°, 92°, 152° and 212°, making 60 divisions between each section, and for more accurate work every 30° are registered. The great discrepancy found in the thermometers made up for the trade is from the fact that the intermediate points are not observed. A top and a bottom degree only are pointed off and the rest of the scale has to take chances for correctness. So when it is considered how difficult it is to procure even a small amount of tubing that has an equal

calibre at every part—and by far the greater portion is very far off in this particular—it is no wonder that it is only by accident that one happens to become the happy possessor of a first-class instrument. Where it is imperative to determine the temperature with exactness, the only recourse is to have the thermometer verified and use the necessary corrections in connection with it.

My advice is to try the freezing and boiling points of every thermometer to be used, for one can rest assured that if these do not register correctly there is very little probability of any other part being of much value. One other fact should not be overlooked in selecting a thermometer, namely, the complete absence of air. This can readily be determined by inverting the instrument and giving a few taps on the end, when, if free from air, the mercury will completely fill the tube and show an empty space in the bulb, this again will disappear when the instrument is turned to its proper position and the mercury descends in the tube to its normal place. Besides these precautions there is nothing to indicate a good thermometer except a comparison with one of known accuracy.

COCOA: ITS PRODUCTION AND USE.

By William B. Marshall.

One of the engravings in Dufour's "Treatise on Coffee, Tea and Cocoa," published in 1688, shows a Chinaman, a Turk and an American aborigine having a merry good time at a liquid banquet—the Chinaman with his tea-pot and tea, the Turk with his coffee-pot and coffee, and the American with his chocolate urn and cocoa. Another picture in the same work shows a Turk, an American and a Chinaman, each with a cup of his favorite beverage. Contentment glows on the face of each, but the way in which the Turk and Indian regard the Chinaman indicates that they are thinking or saying, "Your tea may be good, but what I have here is far better," and of the three the Indian seems best pleased. Theoretically, cocoa should hold first rank in the field of table beverages, but in practice the order of rank is coffee first, tea second and cocoa third. They hold this relative rank in the quantity grown and used, in the commercial value and in the frequency of use. All this is so notwithstanding the fact that nearly everybody likes cocoa from the very first time it is tasted, and

that it is almost entirely free from the attacks to which coffee and tea are subjected by those who consider their use unhealthful.

To compare the use of cocoa to the use of coffee and tea would be somewhat like comparing cake to bread. The cake is used in less quantity, is more expensive, is more nourishing, and appeals more sharply but less enduringly to the taste than the bread. So with cocoa. Its appearance on the table at intervals, even frequently, is hailed with delight, but it has not been able to establish itself to any great extent as part of the regular diet. Tea and coffee, though of less pleasing taste, are wanted almost as regularly as bread and the cocoa is wanted occasionally like the cake. As cocoa is usually prepared with milk, the beverage is much more expensive than tea and coffee, which are prepared with water. The raw cocoa itself also is more expensive than either of the other two materials, if account be taken of the amount and cost of each required to make an equal quantity of beverage. The milk, the cocoa and the large quantity of sugar used to sweeten to taste, all combine to make the beverage a rich and concentrated food, and, after a period of its steady use, headaches and other slight derangements, cause one to turn from it, just as happens after a surfeit of sweets. Doubtless a part of this result is due to the fact that the milk is boiled and is taken while hot, and hence has effects different from those attaching to the use of cool, raw milk. What has been said above is not to be considered as being at all derogatory to the value of the beverage as a food, but rather as being a hint that in diet there must be a balancing of quality and quantity. An increase in the former should be accompanied by a decrease in the latter. Unfortunately, because of habit, we are momentarily uncomfortable, unless we receive a certain cubic measurement of food at the usual periods, and we are inclined to fill up to a certain point without much present concern as to whether the filling is a highly concentrated food or a preparation of sawdust, so long as the palate is pleased, the cubic requirements satisfied and the usual length of time spent in eating.

From personal experience, I am able to praise the food value of cocoa, whether it be in beverage form or in the form of chocolate. In the latter form, it is especially valuable on occasions when a meal is to be postponed for an hour or two, as often happens when one is traveling. Possibly it is an unconscious recognition of its food value that makes chocolate one of the most popular of the confections and

other materials offered for sale by newsboys on trains. While considering this portion of the subject, one might find amusement and profit by inquiring into the facts which underlie the very common offering of chewing-gum and chocolate side by side in the slot machines—the former being usually in the 5 cent side of the machine and the latter in the 1 cent side. And why can both these sell through inanimate machines, while the cough drop, which formerly had the streets to itself, seems to require not only a man, but a man in continual motion, to effect a profitable number of sales.

The cocoa trees belong to the large plant order *Sterculiaceæ*, which contains nearly fifty genera and more than five hundred species. The order is remarkable because of the immense size of some of its trees. The *Adansonia digitata*, or baobab tree, of Africa, which yields the fruit called monkey bread, often has a trunk more than 20 feet in diameter. The ceiba trees are remarkable not only for their size, but also for the immense buttresses which bolster up the trunk on several sides, and whose bases extend many feet from the center of the tree. The order includes not only large trees, but also shrubs and tender herbs, and, as might be expected from the large number of its species, it yields many economic products, such as timbers, medicines, gums, fibers, foods, etc. The most important, and among the most interesting of the Sterculiaceous plants, are the cocoa trees—the source of cocoa, chocolate and cocoa butter. The flowers and fruits of many of the order have a foul odor, and hence the ordinal name *Sterculiaceæ*, from the Latin *Sterculius*, the patron deity of manuring, from *stercus*, meaning dung. Notwithstanding the uncomplimentary name that has been given to the order the deliciousness of the beverage cocoa has gained for the genus which includes the cocoa trees, the name *Theobroma*, meaning a food for the gods. There are several species of cocoa trees in cultivation, but the most important of them is the *Theobroma cacao*, L., which is cultivated almost to the exclusion of the others. Many agricultural varieties have been produced through selection and cultivation.

The tree attains a height of from 15 to 35 feet, and a diameter of from 12 to 15 inches. The trees are arranged in rows, either by planting seeds or by setting out nursery plants. At a little distance the plantation resembles in a general way an apple orchard, the cocoa trees having an irregular growth like the apple, and the trunk often being distorted and leaning like that of the apple, but of smaller

diameter. The leaves are evergreen, glossy, thick and large. They commonly reach a length of 8 to 15 inches, and often are much longer. The flowers are very small, and have five yellow petals in a pink calyx, on a stalk about an inch long. As with many other plants, there is no relation between the size of the flower and the size of the fruit. The cocoa flower is so small as to be insignificant, but the fruit which it produces is 5 to 10 inches long, 4 to 6 inches in diameter, and weighs several pounds. The morning glory's flower is many times as large as the cocoa flower, but its fruit is many thousand times less, both in size and weight, than the cocoa fruit. More striking instances of the absence of anything like a uniform ratio between size of flower and size of fruit could readily be cited.

The cocoa flowers appear in clusters in the axils of present or former leaves on the larger parts of the tree, including the trunk almost to the ground. Consequently the fruits appear at the same places, viz.: on the trunk and thicker branches. In this respect the cocoa tree is one of the exceptions, as most trees bear their fruits on the smaller branches. As the cocoa fruit weighs several pounds, it is reasonable to suppose that the smaller branches would be unable to support the weight, and hence the burden is relegated to the trunk and stouter branches. In our own region, we do not commonly see fruits borne in this way, but instances are not altogether wanting. The fruit of the Osage orange is often borne on the thicker limbs, and even on the trunk. In this case, as in the case of cocoa, the weight of the fruit has probably been the chief factor in determining the points at which it shall be borne. When ripe, the cocoa fruit is of a golden-yellow or yellowish-brown color. It comes to maturity in about four months after blossoming. In shape it very much resembles our spindle-shaped muskmelon, except that it is a little more pointed at the end. Running from the stem end to the bud end of the fruit are several depressions, which divide the surface of the pod into segments, such as we see in the muskmelon. The skin is quite smooth. The fruit is often compared to the cucumber to give an idea of its shape and general appearance, but the resemblance to the muskmelon is much closer. When fresh, the rind is tough and leathery, easily indented with the finger nail or cut with a knife. In this condition the fruit is solid and heavy, being filled with pulp and seeds. The seeds at this time are soft—somewhat firmer than a ripe lima bean. When the fruit is dried, the pulp disappears, the

beans become hard and brittle, and the rind becomes hard and woody. The interior being now empty of all the pulp, except a few stringy remains, the seeds rattle about with every disturbance of the shell.

Each fruit contains from twenty to forty seeds, which, when cured, become the cocoa beans of commerce. Each seed is enclosed in a pale crimson, paper-like husk which is somewhat hairy on the outside but very smooth and shining on the inner surface. It adheres closely to the kernel, but the latter shrinks away in drying, and still more in the roasting process, so that the shell may be easily cracked and removed. The kernel consists of two very large cotyledons, remarkable for the way in which they are twisted and folded and for the manner in which the radicle or germ spreads out to all parts of the seed to line every twist and fold. The germ is hard and stony. It is, of course, physiologically of prime importance since it is the part which sprouts when the seed is planted. To the manufacturer also it is important because of its uselessness to him, and its removal adds one step to the work of making cocoa.

The trees begin bearing about the end of the third year and are in their prime at the tenth year. They continue to yield profitable crops for thirty-five to forty years. It is estimated that the average yield is about thirty-six fruits or 3 pounds of commercial cocoa beans per tree per annum. Sometimes a tree will bear eighty to a hundred fruits in the year, yielding 7 or 8 pounds of beans. In exceptional cases the yield may be even greater than this. Flowers and fruits in all stages of development may be found at all seasons of the year, but there are two principal harvests—one in June and one about Christmas, the former being called in American countries the harvest of San Juan and the latter the harvest of La Natividad.

In harvesting, those fruits which grow within easy reach are cut off with a machete, while those which hang high are brought down by means of a long pole with a knife so arranged at the top that it will cut either by a thrust or a draw. The ripe fruits are known by their golden-yellow or brown color or by sounding hollow when rapped. In cutting, care is necessary to avoid injuring the swelling or "eye" on the tree at the point where the fruit stem is attached, as it is this swelling which produces the future fruit.

The fruits are generally allowed to pile up for a day or two and are then cut open and the pulp embedding the seeds is readily taken

out by a deft movement of the hand or of a wooden spoon which is often used for the purpose. During this operation a large portion of the pulp is removed by the mere handling, and as the pulp is soft and juicy another large portion drains off as liquid. The beans are then packed in barrels or boxes, covered over with banana leaves, snugly stacked and allowed to ferment for three or four days. As in all operations making use of fermentation great watchfulness is necessary to prevent a too rapid or too great rise in temperature. Very often, and especially in parts of Venezuela, the fermenting is done by placing the beans in holes in the ground and covering them with clay. Beans prepared thus are known as clayed cocoa. The clay used is of a warm brick-red color and greatly improves the appearance of the cured bean, without, however, having any great effect upon the judgment which an expert dealer in cocoa will pass upon the quality of the inside of the bean. In the fermenting process the color changes from a pale crimson to the dark brown which the seeds have when they reach our markets; the kernel loses nearly all its bitterness, and even in this unroasted condition, if sugar be added, it tastes much like chocolate.

The next operation is to remove nearly all the remaining pulp and the slime of fermentation. This is done by slipping and squeezing the beans through the hands or by dancing among them with the bare feet. They are then to be thoroughly dried—usually by exposing them to the sun, but often by passing them over steam coils. On a small scale the sun drying is done by exposing the beans on mats or trays or anything that will permit easy and quick handling. On large plantations the drying is done on box-like platforms especially constructed for the purpose. These platforms are raised a little from the ground and have a sliding peaked roof which may be quickly slid back and forth so as to cover or uncover the drying beans. The object of the sliding roof is to protect the beans from rain or sudden dampness, either of which, if allowed to reach the beans after the drying has begun, would greatly lower the quality. The roof is used also to protect the beans from the burning heat of the sun during the middle of the day. After a final sorting, which is done by hand, the beans are bagged and are ready for market.

The cocoa tree originated in northern South America, but it has been introduced to all parts of the world in a broad zone on both sides of the equator. It can be cultivated as far as latitude 25°

north and south, but its cultivation as an industry may be said to be confined to the belt between latitude 15° north and 15° south. In suitable stations (sea level to 1500 or 2000 feet) it is cultivated from middle Mexico to central South America, many of the West Indian Islands, the East and West coasts of Africa, India, Ceylon, Java, Borneo, northern Australia and many of the Polynesian Islands. Usually the bean takes its commercial name from the country producing it, but the products of some countries are known by names otherwise derived. The Mexican is known as Mexican, or Soconusco; the Brazilian as Brazilian, Bahia or Maranham; the Venezuelan as Maracaibo or Caracas; the Ecuadorean and Peruvian as Esmeralda or Guayaquil; that of Guiana as Berbicé. Ecuador grows and exports a larger quantity than any other country, and cocoa is perhaps her most important product. Trinidad comes next. Venezuela comes third. The African crop is growing in importance, and its export exceeds that of Venezuela, and is approaching that of Trinidad.

Cocoa was the first of the three great beverages to make the conquest of Europe, but, when coffee came into the field, cocoa had to take second place, and then came tea to wedge itself between the other two, thus pushing cocoa into third place.

Payen gives the following percentage analysis of cocoa: Fat (cocoa butter), 52; nitrogenous compounds, 20; starch, 10; cellulose, 2; theobromine, 2; saline substances, 4; water, 10; cocoa red and essential oil, trace. Until a few years ago theobromine, caffeine and theine were thought to be chemically different, but they are now believed to be identical, not only in composition, but also in their effects. All three are mild cardiac stimulants, and it is chiefly this effect that has been the handle of the sword in the onslaughts that have been made against the use of tea and coffee. During their whole history, and especially during their early history in Europe, they might have said, as Robert Burns said when one of his moral shortcomings attracted particular attention, "the more they clatter the better I'm kenned." Cocoa has never been subjected to any of the opposition that has beset the paths of the other two beverages, although it contains about 2 per cent. of theobromine, while tea contains 2 to 3 per cent. of theine, and coffee contains from 1 to 2 per cent. Hence, in the matter of the alkaloid, cocoa deserves a trifle better standing than tea, and a little poorer stand-

ing than coffee—when the percentages of theine and theobromine in the raw materials are considered. But how much theine goes into a cup of tea, how much caffeine into a cup of coffee, and how much theobromine into a cup of cocoa or a cake of chocolate? And, further, what part of each after reaching the stomach can place itself on such intimate terms with its host as to call forth heartfelt responses? In determining what amount of each alkaloid finally reaches the stomach, account must be taken of the fact that for each cup of the respective beverages tea leaves are used in almost featherweight quantities, coffee is used by the tablespoonful and cocoa is used by the teaspoonful. Of the tea and coffee the leaves and grounds are left in the pot, and they retain at least a part of the theine, while the cocoa, being an emulsion, is all consumed and all the theobromine is swallowed. Tea and coffee are generally denied to children and invalids, but this is rarely or never the case with cocoa; and children are allowed to eat large quantities of chocolate candy without receiving any warning other than that which is so often necessary to keep them from stuffing. On account of their tender years and as their systems are unaccustomed to the alkaloid it might be expected that in the sudden use of cocoa and chocolate the theobromine would manifest very obvious effects, just as tobacco, the first time it is smoked, has effects which are unequalled at any future smoking; but such does not appear to be the case, and about the only marked effects are such as come from an improper adjustment between quantity and quality of food. Except in the matter of alkaloid, cocoa differs in all respects from tea and coffee, as it is a true food, and the other two are not, their main value consisting in the tendency of the theine to retard waste of tissue. The cocoa has the double effect of retarding waste because of the theobromine; and of furnishing the material for new tissue and for energy, because of the starch, oil and nitrogenous compounds.

Upon entering a cocoa and chocolate factory, the sight of a number of various kinds of machines leads one to suppose that the manufacture involves very complicated processes; but, as a matter of fact, the reverse of this is true. The earliest tools used for the purpose were simply a stone and pestle, or roller for crushing the roasted seeds to powder. Practically every step in the making of chocolate is simplicity itself, and the making of a loaf of bread involves as much, if not more, science. The essential steps are the

following: roasting; crushing and winnowing to remove the outer shell and the husky matter which lines each twist and fold of the kernel; removing the hard germ or radicle; grinding to a paste; cooling. This gives cocoa. If it is to be made into sweet chocolate, the paste is flavored and sweetened. All the operations can be performed by hand; but machinery has been developed to such an extent that the handwork is nearly restricted to stoking the fires and shifting the cocoa from time to time into positions where the machinery may set to work on it.

When the beans are broken out of the bags, they are sifted, cleaned and sorted in order to remove foreign matter and unsound beans. They are then roasted in revolving cylinders, in which operation the flavor is greatly improved, and the shell and kernel become brittle, so that they are easily separated from each other, and the kernel is easily broken into small grains. The beans are then fed into a crusher, which breaks them into small pieces. As they fall from the crusher, a blast of air winnows out the hull and the tough linings of the folds. The small grains of pure cocoa and the hard germs fall together in one pile. The grains are known as cocoa nibs, or cracked cocoa. Some people prefer to buy the nibs rather than the further prepared cocoa, because they feel assured that in this form there is no adulteration. When the nibs are used, they require further crushing and long boiling to prepare them for the table. In this form the cocoa contains all its oil, and makes an exceedingly rich beverage. After the germs are removed by a machine especially adapted to that purpose, the nibs are fed to heated mill-stones, or to grinding machines which work on much the same principle. In the grinding they are reduced to a thick paste, and not, as one would expect, to a powder. This is due to the great amount of oil which they contain and which the heat and friction soon turns into a fluid. During the grinding, a large part of the oil oozes from the machine, and is caught in drip-pans. It is a thick and creamy liquid; but upon cooling, it hardens into a waxy solid of the color of manila paper. This is the crude cocoa butter of commerce. The cocoa paste then has some of the oil returned to it or some taken away, according to the degree of richness which the manufacturer wishes his product to have. The paste is then placed in pans, and the resulting cakes are the cocoa, or "plain chocolate," from which the beverage is made. When the cocoa is to be almost entirely free

from oil, the paste is subjected to pressure, and the hard mass resulting therefrom is known as rock cocoa.

Much of the caked cocoa is ground to powder and packed in tins, so that when it reaches the consumer it is in about the same condition as when it left the factory, and no grating is necessary to prepare it for infusing. The paste mentioned above, if it is to be made into the confection chocolate, is usually enriched by returning some or all of the oil, and is flavored with cinnamon or vanilla, sweetened, molded into cakes, cooled and wrapped in fancy papers. The gloss on the edges and one flat side of the cake is due to the contact of the chocolate with the molding pan, just as a cake of corn-mush is glossy wherever it has been in contact with the pan. After it is molded, the chocolate must be kept cool in order to retain its firmness and the gloss. On this account, the up-to-date chocolate factory is supplied with a refrigerating plant in order that the storage-rooms may be kept as cool as desired. The depth of color gives some hint as to the amount of oil the chocolate contains. The richest grades are those used to coat the very finest chocolate creams, and they are often so dark as to deserve to be called black rather than brown. A chocolate which, when held in the hand, quickly softens, smudging the fingers, contains much oil.

The cocoa shells or hulls are not thrown away nor burned, but are sold to be used for making a beverage similar to cocoa, but far inferior. In Ireland this stuff is called "miserables."

The cocoa butter, the Oleum theobromatis of the Pharmacopœia, is a fixed oil which at ordinary temperature is solid, but which melts at from 86° to 92° F. When bleached and refined it loses its pale-yellow color and becomes snow white and glistening like cold lard. It is a trifle lighter than water, its specific gravity being ·97 to ·98 (at 59° F.). Unlike a great many oils it does not become rancid from long standing. Repeated meltings and hardenings affect its quality but little. On these accounts it is especially valuable for many purposes. It is very nutritious and its odor and taste are pleasant, making it a valuable substitute for cod-liver oil in cases which require that kind of a tonic and yet in which the palate and weakened stomach rebel against nauseating doses. The butter is used to a very great extent as the chief material in suppositories and in various cosmetics and pomatums. For these purposes it is admirably adapted because of its soothing and healing qualities, its

freedom from acid and from the fact that although it is usually firm the temperature of the body quickly reduces it to a fluid condition. The low temperature at which it melts has made it one of the chief materials depended on for medication when the need is for a salve or ointment that shall rapidly turn to a fluid and be absorbed. The plain cocoa butter, without medication of any kind, is an excellent ointment for chapped hands and lips. The butter is also used for making fine soaps and in some of the cream confections.

The correct name is cacao and not "cocoa," and according to rules we should say cacao. But our people claim the right to break the rules to suit their convenience, and, with the exception of a few purists, they have used the word cocoa. In fact, cacao is altogether unknown to the greater number of our people. To pronounce it in their presence calls forth a question which makes it necessary to explain by the word "chocolate" or "cocoa." When the grocer is asked for cocoa he should, according to the dictionary, hand out a preparation of cocoanut, but in every case he will hand out the beverage material forming the subject of this paper. The people of this country have long since discontinued the use of "cocoa" to indicate any of the food products of the cocoa palm and always add the word "nut," making the word cocoanut. Cocoa fiber used in cocoa matting is derived from the cocoa palm or cocoanut palm and has no relation whatever to the beverage cocoa.

Great numbers of our people believe that cocoa (cacao), coca and cocoanut are the same product or that they are derived from the same source. There is, of course, no close relation among them, as they come from three different plant orders and are used for different purposes. There is also some confusion between "cocoa" and "chocolate," some persons using "chocolate" to indicate the confection, the cocoa in cakes and the beverage, while others use it to indicate the confection only, calling all the unsweetened forms and the beverage cocoa. The tendency is to use "chocolate" to indicate all the manufactured forms of cocoa and the beverage also. One of the largest cocoa and chocolate manufacturing firms has published the following definitions:

Cocoa.—The commercial name given (1) to the seeds of the small tropical tree known to botanists as Theobroma cacao; (2) to the cracked or coarsely ground product of the roasted seeds, sometimes designated more particularly as "cocoa nibs" or "cracked cocoa;"

(3) to the finely pulverized product of the roasted seeds from which a portion of the fat has been removed, sometimes designated as "breakfast cocoa" or "powdered cocoa."

Chocolate.—(1) The solid or plastic mass produced by grinding to fineness the kernel of the roasted seeds of Theobroma cacao without removing any of the fat, sometimes called "plain chocolate" or "bitter chocolate;" (2) the same product to which have been added sugar and various flavoring substances, sometimes called "sweet chocolate" or "vanilla chocolate."

It is interesting to note our tendency to interchange "o" and "a" in certain words. "Cacao" wants to become or has become "cocoa;" "café" has become "coffee;" and "Curaçao" has become "Curaçoa."

LIME WATER.

By M. I. Wilbert.
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Despite the fact that lime water is probably the best known and most widely used of all pharmaceutical preparations, its peculiarities and shortcomings have received but little attention by investigators and pharmacists.

The fact that it may, and sometimes does, fall far short of what is usually understood by the term, lime water, has repeatedly been noted, while the reason for this shortcoming is no doubt to be found in the fact that, in by far the greater number of pharmacies, the care for and the making of this preparation is usually entrusted to the apprentice, or boy about the place.

That lime water is deserving of greater attention will become evident when we realize the very important part that it has, from time to time, taken in the armamentarium of the physician and also recognize the great harm that may possibly result from the use of a comparatively inert preparation.

Lime water has been used from the earliest times, and is to-day recognized as one of the most valuable remedies in a number of affections of the gastro-intestinal tract, particularly in the treatment of infants and children. Lime water is well known as an efficient antacid, and is also used quite extensively as a local application or as a necessary ingredient in preparations designed for external use, notably the well known lime liniment or carron oil. It is also used

as an addition to bring about chemical change of the more active substances, as in the well known black or yellow washes. All of these preparations, it will be noted, depend largely on the fact that the lime water used be of the full strength.

Lime water is official in all known national pharmacopœias, and although the official titles as well as the prescribed modes of preparing the solution differ materially, the ultimate object that is sought by all is practically the same—a saturated solution of calcium hydrate in water, at ordinary temperatures.

Calcium hydrate, as is well known, varies considerably in its solubility, being much more soluble in cold than in hot water, and differing in this respect from the majority of chemical substances. So little is known about the physical or chemical changes that are produced by the solution of chemical substances, in water, that it would be futile to attempt, at this time, a general discussion of the underlying principles or factors that regulate the solution of calcium hydrate. The subject has been investigated in a practical way by several persons, among them M. A. Lamey (*Comptes Rendus*, February, 1878, page 333), L. C. W. Cocx (*Arch. f. Phar.*, 1879, page 145), and Thos. Maben (*Phar. Jour.*, 1883, reprinted in A. J. P., 1884, page 110).

The United States Pharmacopœia of 1890 defines liquor calcis as "a saturated aqueous solution of calcium hydrate," and gives among other tests one for the quantitative estimation of the contained alkali. The Pharmacopœia does not, however, limit the allowable variation of the calcium hydrate in solution, but simply states that 50 c.c. of the official solution should require for complete neutralization about 20 c.c. of oxalic acid, decinormal volumetric solution, corresponding to about 0·148 per cent. of calcium hydrate.

The German Pharmacopœia, on the other hand, directs that lime water should contain from 0·148 to 0·167 per cent. of calcium hydrate, while the other requirements are practically the same as those of the U.S.P.

Just a word here as to the applicability of these two quantitative methods, from a practical point of view.

The German Pharmacopœia directs the use of a normal volumetric hydrochloric acid solution. This, in addition to the added difficulty of making the solution, has the objection of being unduly concentrated; 100 c.c. of lime water requiring only 4·0 to 4·5 c.c. of normal hydrochloric acid for complete neutralization.

The U.S.P. method, using a decinormal volumetric oxalic acid solution, has the advantage that a sufficiently accurate solution is readily made, by any pharmacist, while the solutions themselves are more evenly proportioned.

The testing of lime water can readily be done without the use of a burette, or other complicated apparatus, a 50 c.c. metric graduate being quite sufficient to measure the solutions. The test itself using phenolphtalein as an indicator is sufficiently interesting to appeal to any boy or apprentice, and if properly instructed, the latter would probably take considerable pride in standardizing his lime water.

To get some additional data as to the care devoted to the making of this preparation by the local pharmacists, a number of samples of lime water were purchased and examined. It will not be necessary to enumerate in detail the results of our investigation, suffice it to say that the samples as purchased varied from 0·043 to 0·165 per cent. of calcium hydrate, while by far the greater number of the samples fell below 0·148 per cent., the average requirement of the U.S.P. It may, however, be of interest to note that one-half of the samples contained less than 0·120 per cent., and one-fourth of the total, less than 0·085 per cent. of calcium hydrate, while, as noted before, one sample contained as little as 0·043 per cent. of the alkali. All of the purchased samples contained appreciable quantities of soluble sulphates, indicating that all had been made with common tap or city water. One sample contained appreciable quantities of a chloride, and this, on inquiry, it was learned, had been made from oyster-shell lime without separating the coarser particles, as directed by the Pharmacopœia. Further inquiry in this direction revealed the fact that the available oyster-shell lime, "Put up expressly for pharmacists," has not been sufficiently calcined and contains appreciable quantities of carbonates, which in turn appear to have, enclosed, soluble chlorides that are not readily washed out in the ordinary way. The difficulty can, of course, be overcome by following the U.S.P. directions and decanting the finer particles of calcium hydrate from the coarse lumps that usually consist of uncalcined carbonate.

Some experiments made with so-called C. P. calcium oxide, and also with calcium oxide from marble, did not give any appreciably better results than those made from ordinary lime. In ordinary practice, therefore, it would be perfectly safe to use commercial lime, providing several very essential precautions are observed.

The first of these is to use a lime that has been thoroughly calcined, and then to wash the resulting hydrate with distilled water, or at least, boiled and cooled water, until all traces of soluble salts have been eliminated.

The use of distilled or boiled water is to be recommended, as it facilitates the production of a more uniform, as well as a more stable preparation. This is to a large extent due to the fact that the contained gases, particularly the carbon dioxide, have been eliminated. In this same connection it may be well to call attention to the fact, noted by several of the investigators quoted above, that slaked lime that contains more than from 25 to 30 per cent. of carbonate is not suited for making lime water, as this contained carbonate appears to interfere with or to impede the solution of the hydrate.

A slight change in the Pharmacopœial directions for making lime water would also appear desirable. If instead of directing approximately 1 part of lime to 300 of water, the Pharmacopœia directed 1 part of lime to 25 or 30 parts of the solvent and allow the water to be replaced from time to time, or as long as the magma contains a sufficient quantity of hydrate to readily yield a satisfactory product, the directions would correspond more closely with the practice as usually followed.

The German Pharmacopœia directs that lime water should be filtered and dispensed perfectly clear and free from any suspended carbonate. This provision might well be included in our own Pharmacopœia, providing that the first portions of the filtrate be directed to be thrown away. This would be indicated by the fact that filter paper has a peculiar affinity for calcium hydrate, so much so that the first portions of lime water passing through a filter, lose from 15 to 20 per cent. of the contained alkali.

One other precaution that might well be observed in the making of lime water is to use cold water, and to keep the lime water containers in a cool place where they will not be subjected to sudden or extreme changes of temperature.

The more desirable Pharmacopœial changes might be summed up as follows:

Increase the relative amount of lime and permit the use of successive quantities of water.

Direct that lime water be dispensed clear, and that when filtered the first portion of the filtrate be thrown away.

Direct that freshly calcined lime, or lime that has been carefully preserved from the action of the atmosphere be used, and that it be comparatively free from carbonate.

Indicate a minimum as well as a maximum content of calcium hydrate and call attention to the desirability of testing lime water, from time to time, with a view of keeping it within the prescribed standards.

SOME RARE FIXED OILS.

By Dr. George R. Pancoast and Willard Graham.

There are a number of fixed oils for which there is a certain though limited demand in commercial circles and which for various reasons are difficult to classify. The best form of classification is probably the one based on the method of preparation.

Thus these oils can be grouped under the following divisions:

(1) Oils made by expression.

(2) Oils made by extraction with volatile solvents.

(3) Oils made by infusion with fatty solvents.

(4) Oils obtained as by-products in pharmaceutical manufacturing.

The oils made by expression are: Oils of walnuts, hazelnuts, hickory nuts, pumpkin seed, larkspur seed, stramonium seed.

The oils made by extraction with volatile solvents such as alcohol, ether, benzin and acetone are: Oils of lobelia, stillingia, larkspur, mullein, also in many cases, the oils given by expression.

The oils that occur as by-products in the manufacture of pharmaceuticals are: Oils of nux vomica, tonka, ergot, larkspur, strophanthus.

The oils made by infusion with fatty solvents are: Oils of lobelia, belladonna, stramonium, hyoscyamus, cantharides, capsicum; also many of the oils as given under expression and extraction.

The method used in making the oils by infusion in most cases closely resembles the formula as given by Dieterich for the making of oil of henbane.

"One hundred grammes of the coarsely powdered drug is moistened with 75 c.c. of alcohol and 2 c.c. of ammonia water and gently packed into a percolator of suitable size; let stand over night, then add 600 c.c. of olive oil and digest for 12 hours. The oil is then

removed by expression and the drug again treated with 400 c.c. of oil and this again removed by expression. Make up the product to 1,000 c.c. with olive oil."

We have had occasion to examine many of the above oils of which we give the following data:

	Specific Gravity 15° C.	Acid Number.	Saponification Number.
Oil of walnuts	0·925	3·5	197·0
" hazelnuts	0·917	3·5	192·5
" hickory nuts	0.921	2·3	195·6
" lobelia	0·925		
" strophanthus	0·927		
" pumpkin	0·920	3·5	195.5
" larkspur	0·884		
" nux vomica	0·935		
" ergot	0·918		

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EXAMINATION OF COMMERCIAL PEPPERS.

BY JAMES W. GLADHILL, A.M., P.D.

Although indigenous to Southern India, the pepper plant is now cultivated in different parts of the world, most of the commercial article coming from the islands of the Indian Archipelago, the Philippines and the West Indies.

It is recorded that in ancient times pepper was used as a medium of exchange. It was also used as a symbol of the spice trade, and in Rome the dealers in spices were known as Piperorii, later, in France as Pebriers, and in England as Pepperers.

The following is a description of pepper, based upon the official description, although the different kinds of pepper vary somewhat, as will be shown later. Black pepper, or the piper of the Pharmacopœia, consists of the unripe fruit of *Piper nigrum* Linné (Fam. *Piperaceæ*). The fruit is globular, about 4 mm. in diameter, reticulately wrinkled on the surface from the dried and contracted sarcocarp, blackish-brown or grayish black externally, lighter internally, and encloses a single globular seed, which is whitish, mealy and contains an undeveloped embryo in a central cavity.

White pepper differs from black pepper in that it consists of the ripe fruit of *Piper nigrum*, from which the pericarp and mesocarp

have been removed by immersion in water and subsequent rubbing with the hands; it is also made commercially by rubbing the hull off of the dried black pepper by friction in a machine designed for the purpose, in which case it is smaller than when made from the ripe fruit.

White pepper made from the ripe fruit consists of the seed, which is covered with a whitish coat, having 10 to 14 lines running from base to apex; under this is a reddish-brown testa, very thin, next the hard inside layer, and lastly around the central cavity is a mealy portion relatively thick. This is a general description of the two peppers. The different varieties which have been examined will be taken up separately.

The writer has examined 13 different kinds of peppers, all type samples, 9 of which were black peppers and 4 white peppers; they were as follows: Black peppers—Lampong, 4 samples; Lienburg, 4 samples; Singapore, 4 samples; Tellicherry, 4 samples; Trang, 2 samples; Aleppy, 2 samples; Acheen A, 4 samples; Acheen D, 2 samples; West Coast Sumatra, 2 samples.

White peppers—Coriander, 4 samples; Singapore, 3 samples; Penang, 3 samples; Decorticated, 3 samples. The hull was also examined in the same manner as the pepper.

The following determinations were made: Ash, ether extract, piperin and oleo-resin as being of the highest importance.

The following methods were used as being the simplest that could be devised. These can be used by almost any pharmacist without much expense.

Ash.—For the determination of the ash, 1 gm. of the ground pepper was heated to redness in a tared porcelain crucible, and maintained at that temperature for one hour, weighed, and reheated until the weight remained constant.

Ether Extract.—This was determined as follows: 10 gm. of the ground pepper were packed in a small cylindrical percolator, which was connected with an Erlenmeyer flask by means of a perforated and well-fitted cork. Into this cork a glass tube was also inserted and connected by means of a rubber tubing with another glass tube of equal caliber, inserted in a cork fitted to the top of the percolator. This constituted the ether-extractor, and from 40 to 50 c.c. of ether were used for making an extraction. The percolate obtained was transferred to a weighed beaker, the flask being washed

with a little ether, and was then set aside in a warm place, protected from dust, until the ether was evaporated; then a current of air was conducted over the beaker, until all ethereal odor had been removed, after which the weight was taken.

Piperin.—This constituent was determined as follows: 10 gm. of the ground pepper were exhausted with 95 per cent. alcohol, the percolate evaporated, then solution of potassa, $\frac{1}{10}$, about 100 c.c., was poured into the beaker and agitated, then set aside for twenty-four hours, shaking occasionally so as to facilitate the action of the alkali in dissolving the resin; then the portion remaining undissolved was collected on a filter, washed free from alkali and dried, then dissolved in 95 per cent. alcohol, the alcoholic solution filtered into a weighed capsule, the alcohol evaporated and the crystals weighed, as piperin.

Oleo resin was determined by subtracting the piperin found from the ether extract.

The peppers examined will be described in the order of their superiority. It is a custom in the trade to value them according to their weight per gallon.

There appear in the different peppers, grains which are not wrinkled to any great extent, and in which the outer coatings do not adhere to the inner layer; these will be spoken of as unwrinkled berries.

The term hull, as herein used, refers to the sarcocarp, which has been knocked off in handling. The quantity present indicates usually the way it is attached to the perisperm, whether it adheres strongly or not.

Singapore pepper comes from the island of that name. It is dark-brown, a few of the grains being black, with the edges of the wrinkles of a lighter brown or grayish color. Over 95 per cent. of the grains are fully mature, there being very few of the light or pithy grains present, *i. e.*, grains which are all hull and have no perisperm or only a pithy interior. Stems and pedicels are present, but not in excess of 2 per cent. The grains are large, hard, and have a very fine flavor. Hulls are present in very small quantity, their separation being due to the handling of the bags in which the pepper is imported. The hull is very difficult to remove from the inside layer. The diameter of grains is from 3 to 7 mm., and averages 5 mm.

The following results were obtained in an examination of four samples taken from different lots of this pepper. The analytical data herein recorded are all expressed in percentages:

No.	Ash.	Ether Extract.	Piperin.	Oleo-resin.
1	3·5	9·76	7·13	2·63
2	3·7	8·76	7·68	1·08
3	4·2	9·52	6·58	2·94
4	4·5	9.60	7·33	2·27

Average, ash, 3·975; ether extract, 9·41; piperin, 7·10; oleo-resin, 2·23; color of the ether extract, greenish.

Singapore and Tellicherry, which will be considered next, are the two finest peppers on the American market at the present time. *Tellicherry* pepper comes from Tellicherry in the Madras Presidency, British India. It is light to medium dark-brown in color, and small and pithy grains are almost entirely absent; stems and pedicels are present in very small amount. The grains are large and well filled. The sarcocarp is wrinkled in all grains, and adheres very closely. The amount of hull present is about 1 per cent. Grains which are unwrinkled do not appear in these two varieties. Four samples were examined, as follows:

No.	Ash.	Ether Extract.	Piperin.	Oleo-resin.
1	4·7	8·34	5·91	2·43
2	4·8	8·85	6·02	2·83
3	3·8	7·26	6·56	·70
4	4·5	7·62	6·82	·80

Average, ash, 4·45; ether extract, 8·01; piperin, 6·31; oleo-resin, 1·69; color of the ether extract was greenish.

Aleppy pepper, from India; color from light brown to almost black; small and pithy grains, about 2 per cent.; stems and pedicels present, 1–2 per cent.; unwrinkled grains, about 5 per cent.; hull, 2–3 per cent. The grains are smaller than the preceding, being from 2–6 mm. in diameter. The flavor is not so fine, and neither are the grains as solid. Two samples were examined:

No.	Ash.	Ether Extract.	Piperin.	Oleo resin.
1	4·7	9·65	7·70	1·95
2	4·7	9·47	6·75	2·72

The ether extract is of a greenish color.

Trang pepper, color light to dark brown; small and pithy grains numerous, 10–15 per cent.; stems and pedicels present, but in small amount. The grains vary greatly in size, being from 1·5–7 mm. in diameter. The sarcocarp is wrinkled in almost all the grains, unwrinkled grains appearing only here and there. Hull is present to

the extent of 2-3 per cent. The perisperm is small in most of the grains, therefore the hull is in greater proportion. Two samples were examined:

No.	Ash.	Ether Extract.	Piperin.	Oleo-resin.
1	3·9	8·44	5·12	3.32
2	3·8	8·83	5·61	3·22

The color of the ether extract is greenish-yellow.

Lienburg pepper comes from Japan. It is of a brown color, some of the grains being much lighter than others, and some almost black; about 20 per cent. are unwrinkled, and have a shiny appearance; from 15–20 per cent. have the hull knocked off, and are light brown in color; pithy grains are present in small amount. The grains vary in size considerably from the puffed up, unwrinkled ones to the pithy and wrinkled ones; stems and pedicels are almost entirely absent. Hull is present in quantity, being rubbed off from the unwrinkled berries, upon which the hull is very soft and brittle. This variety is used by some manufacturers for the decortication of pepper, but it does not give nearly so fine a flavor as Tellicherry or Trang. The diameter is 2–6 mm. Four samples were examined:

No.	Ash.	Ether Extract.	Piperin.	Oleo-resin.
1	3·8	8·70	6·50	2·20
2	4·0	9·48	6·28	3·20
3	3·6	8·83	5·98	2·85
4	4·0	8·78	6·31	2·47

Average, ash, 3·85; ether extract, 8·949; piperin, 6·2675; oleo-resin, 2·68. The color of the ether extract of Nos. 1 and 2 was brownish; of Nos. 3 and 4, reddish.

Lampong pepper comes from the Dutch Presidency, Sumatra. It is of a brownish or black color, having a dirty appearance from adhering soil. The grains are all about the same diameter—4–5 mm. Pithy and small grains are present to the extent of from 5–15 per cent.; stems and pedicels present in small quantity; earth and hull present in relatively large amount. Five to ten per cent. of the berries have the hull removed, and are of a dirty color. The hull adheres rather strongly. Four samples were examined:

No.	Ash.	Ether Extract.	Piperin.	Oleo-resin.
1	5·	8·92	7·76	1·16
2	5·5	10·31	8·30	2·01
3	5·4	8·76	7·00	1·76
4	5·2	9.58	7·28	2·30

Average, ash, 5·275; ether extract, 9·392; piperin, 7·585; oleo-resin, 1·8075; Ether extracts Nos. 1, 2 and 3 were of a dark green; No. 4, a yellowish-green.

West Coast Sumatra comes from the west coast of the Island of Sumatra. Color, dark brown to black; small pithy grains not so numerous, being about 5 per cent., but larger ones are present in considerable quantity; *i. e.*, the large pithy berries have the diameter of 4–5·5 mm. and consist of the dried sarcocarp surrounding a cavity containing nothing but some fine grains of a dark-brown color, occasionally a larger grain will be found which is of a whitish color internally, but which is not the perisperm. Stems and pedicels present about 1–2 per cent.; hull, 3–5 per cent. The sarcocarp is not wrinkled very much in about one-half of the grains; this fact gives the grains a larger appearance. The large amount of oleo-resin in these peppers is due to the large amount of hull in comparison with the inner portion; diameter, 2–6 mm. Two samples were examined.

No.	Ash.	Ether Extract.	Piperin.	Oleo-resin.
1	4·3	9·28	7·00	2·28
2	4·0	9·22	6·68	2·54

The color of the ether extract is greenish-brown.

Acheen pepper, variety A., comes from the Dutch province of that name. Dark brown in color; small pithy grains present to the extent of 3 per cent., but larger ones from 10–15 per cent.; stems and pedicels from 3–5 per cent.; unwrinkled grains about one-half of the whole amount. The hull does not have the appearance of being stretched over the inner portion, as in Singapore and Tellicherry, because the perisperm is very small and the hull is of about the same size as in the Singapore and Tellicherry peppers. Diameter of the grains, 2–6 mm. The varieties of this pepper are the poorest entering American ports. Four samples were examined.

No.	Ash.	Ether Extract.	Piperin.	Oleo-resin.
1	4·3	10·06	7·56	2·50
2	4·5	10·10	7·96	2·14
3	4·	9·80	7·67	2·13
4	4·7	9·20	7·10	2·10

Average, ash, 5·375; ether extract, 9·79; piperin, 7·57+; oleo-resin, 2·23+. Ether extract greenish.

Two samples of variety C. of the same pepper:

No.	Ash.	Ether Extract.	Piperin.	Oleo-resin.
1	5·5	10·46	10·02	·44
2	5·2	10·46	9·94	·52

Ether extract yellowish-green.

This variety contains almost no oleo-resin.

Coriander White Pepper.—It is of a whitish color; grains not wrinkled, with a black or brown speck at the base, which is slightly hollow; twelve to fourteen lines are observed running from base to apex. The outside whitish layer is always thicker at the apex than at the base; small and darker grains do not occur very frequently, although some appear with a light-colored coat slightly wrinkled. The reddish-brown testa under the whitish outside layer is very hard, thin and covers the seed-grain entirely. From the central cavity, which is about 1·6 mm. in diameter, a whitish mealy portion extends, being about one-fifth of the whole inside; from that to the testa is a hard translucent layer. The diameter of the whole grains varies from 3–7 mm. Four samples were examined.

No.	Ash.	Ether Extract.	Piperin.	Oleo-resin.
1	1·0	8·27	6·81	1·46
2	·8	11·68	9·00	2·68
3	1·	8·16	7·16	1·00
4	·8	7·90	6·84	1.06

Average, ash, ·9; ether extract, 9·; piperin, 7·45+; oleo-resin, 1·555. Color of ether extract, lemon-yellow.

Singapore White Pepper.—Color, grayish; larger grains not wrinkled, but from 10–15 per cent. of smaller wrinkled grains. There appears a black or brown speck at the base of all grains which are not wrinkled; base hollow. From ten to thirteen lines are observed running from base to apex. The outside grayish layer is thickest at the apex but not so noticeable as in the coriander pepper. The cavity in the center is larger than in the preceding variety, being 3 mm. in diameter in the larger grains. The mealy inside portion is from one-fourth to one-third of the whole layer. The layer between this and the testa is translucent and of a greenish color. Diameter 2 mm. Three samples were examined.

No.	Ash.	Ether Extract.	Piperin.	Oleo-resin.
1	1·1	8·78	7·26	1·52
2	1·0	8·45	6·78	1·67
3	1·2	8·20	7·10	1·10

Average ash, 1·1; ether extract, 8·57+; piperin, 7·04+; oleo-resin, 1·43. Color of ether extract, lemon-yellow.

Penang White Pepper.—Color, dirty yellowish; about 15 per cent. of the grains do not have the hull removed, but are covered with a yellowish clay, which in fact covers all of the grains; eleven

to thirteen lines are observed running from base to apex. The speck at the base is not easily seen; only after cleaning the grain can it in most cases be observed. The cavity is about 2 mm. in diameter, and is surrounded by a mealy portion, which is about one-fifth of the whole diameter; the remaining portion is of a greenish color and translucent. Diameter 2–5 mm. Three samples were examined.

No.	Ash.	Ether Extract.	Piperin.	Oleo-resin.
1	2·1	7·04	5·74	1·30
2	2·8	7·20	6·76	·44
3	2·6	6·80	5·83	·97

Average, ash, 2·38+; ether extract, 7·01+; piperin, 6·11; oleo-resin, ·93+. Color of ether extract, yellow.

Decorticated White Pepper.—The color is yellowish; the grains have a smooth, shiny surface and appearance, but no outside covering, consisting of the perisperm alone. Some of the grains have a little of the reddish-brown testa adhering, but not many. Broken pieces of perisperm are present in from 5–10 per cent.; that is, in that sold for whole white pepper. There is on the market what is known as broken decorticated white pepper. The central cavity is about 1·6 mm. in diameter, and is surrounded by a mealy portion, which constitutes about one-tenth of the whole grain; the other portion is of a yellowish color and does not appear clear as in the other white peppers. The grains are smaller than the other white peppers, being about 3–4 mm. in diameter, and do not vary much. No lines are observed in this pepper; a small hole is at the base, looking as if pricked with a needle. Three samples were examined.

No.	Ash.	Ether Extract.	Piperin.	Oleo-resin.
1	1·9	7·64	6·25	1·39
2	·8	6·60	6·30	·30
3	1·2	7·26	7·02	·24

Average, ash, 1·3; ether extract, 7·16+; piperin, 6·51+; oleo-resin, ·64+. Color of ether extract, yellow.

The hull is that portion of the grain known as the sarcocarp, which is removed in making white pepper and is sold as such. It varies in color from light brown to a dark brown. It has a pungent odor and taste, although sharper than when ground with the perisperm. The following is a statement of the analysis of several lots of hulls imported into this country.

No.	Ash.	Ether Extract.	Piperin.	Oleo-resin.
1	9·4	6·39	none	6·39
2	9·6	6·39	"	6·39
3	8·9	8·88	"	8·88
4	7·0	8·93	"	8·93
5	7·7	5·36	"	5·36
6	8·3	5·46	"	5·46
7	8·3	5·00	"	5·00
8	8·8	5·92	"	5·92

Average, ash, 8·5; ether extract, 6·54; oleo-resin, 6·54. Color of ether extract from light to dark brown.

As will be seen, there is no piperin in the hull, only oil and resin, but there are on the market hulls which contain broken pepper and will contain from 1 to 2 per cent. of piperin, but the ash is never less than 7 per cent., so that the more hull the greater will be the oleo-resin and the less will be the piperin found in a sample of pepper which has been adulterated with hull, also the ash will be greater.

Conclusions.—The ash should not be above 6.5 per cent. for black pepper, and 3 per cent. for white pepper. None of the samples examined gave so high a percentage of ash; 1 per cent. is allowed for sand and other material which has gotten in in the packing of the pepper; the highest ash was 5·5 per cent. for black pepper, and 2·8 per cent. for white pepper, which was a very dirty sample.

The ether extract should be between 7·5 and 10 per cent. for black pepper, and 6 and 9 per cent. for white pepper. In only one case did the ether extract exceed 9 per cent., and that was in coriander pepper, which sometimes runs as high as 11 per cent., but this variety is never ground for white pepper, but is sold in bulk whole, the cost being too great to permit being ground for commercial white pepper.

Piperin should be present in from 5·5 to 9 per cent. in a good black pepper. Any samples that do not show this percentage are not to be considered good peppers, and while they may be used to blend the flavor they should not be used in such quantity that the percentage of piperin would fall below 5·5 per cent.

The writer examined only one of the adulterants used in black and white peppers besides the hull, and that was cocoanut shells. The result was as follows: Ash 8 per cent., ether extract ·42 per cent.; if this is added to the pepper the ash will be high and the percentage of ether extract, piperin and oleo-resin will be low. Since

Black Pepper.	Ash.				Ether Extract.				Piperin.				Oleo-resin.			
	1	2	3	4	1	2	3	4	1	2	3	4	1		3	
Singapore	3·5	3·7	4·2	4·5	9·76	8·76	9·52	9·60	7·13	7·68	6·58	7·33	2·63	1·08	2·94	2·27
Tellicherry	4·7	4·8	3·8	4·5	8·34	8·85	7·26	7·62	5·91	6·02	6·56	6·82	2·43	2·83	·70	·80
Aleppy	4·7	4·7			9·65	9·47			7·70	6·75			1·95	2·72		
Trang	3·9	3·8			8·44	8·83			5·12	5·61			3·32	3·22		
Lienburg	3·8	4·0	3·6	4·0	8·70	9·48	8·83	8·78	6·50	6·28	5·98	6·31	2·20	3·20	2·85	2·47
Lampong	5·0	5·5	5·4	5·2	8·92	10·31	8·76	9·58	7·76	8·30	7·00	7·28	1·16	2·01	1·76	2·30
W. C. Sumatra	4·3	4·0			9·28	9·22			7·00	6·68			2·28	2·54		
Acheen A	4·3	4·5	4·	4·7	10·06	10·10	9·80	9·20	7·56	7·96	7·67	7·10	2·50	2·14	2·13	2·10
" C	5·5	5·2			10·46	10·46			10·02	9·94			·44	·52		
White Pepper.																
Coriander	1·0	·8	1·	·8	8·27	11·68	8·16	7·90	6·81	9·00	7·16	6·84	1·46	2·68	1·00	1·06
Singapore	1·1	1·	1·2		8·78	8·45	8·20		7·26	6·78	7·20		1·52	1·67	1·00	
Penang	2·1	2·8	2·6		7·04	7·20	6·80		5·74	6·76	5·83		1·30	·44	·97	
Decorticated	1·9	·8	1·2		7·61	6·60	7·26		6·25	6·30	7·02		1·39	·30	·24	

	Ash.								Ether Extracts.							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Hull	9·4	9·6	8·9	7·0	7·7	8·3	8·3	8·8	6·39	6·39	8·88	8·93	5·36	5·46	5·00	5·92

the passage and enforcement of the new food laws there has not been much adulteration except in the use of hulls. This can be determined if the preceding method is adopted. If only about 10 per cent. have been added, recourse will have to be made to the microscope also.

IN AID OF THE STUDY OF THE HISTORY OF MATERIA MEDICA, MEDICINE AND CHEMISTRY.[1]

By Fr. Hoffmann.

Whoever has had occasion to enter upon researches in, and the study of, the history of drugs, aromatic spices, materia medica, or of medicine and chemistry, will have experienced perplexing difficulties in finding and selecting in the vast mass of the pertaining literature of all ages and peoples, the really valuable and most useful standard works for information and reference, or even to obtain a correct estimate of their nature and relative value and usefulness.

As in all literature, succeeding authors have more or less drawn upon the labors and writings of preceding generations and the intrinsic value of the accumulated bibliographic stock of consecutive centuries is to some extent a recurrent and apocryphal one. It therefore requires critical inquiry, intelligent discrimination and considerable time to obtain some familiarity with the precise value and authority, or the want of such, of the respective works, and it may not be amiss to offer some guiding advice to those who are about to spend time and patience in searching voluminous libraries and catalogues, by offering a brief list of some select works for reliable reference and for study.

List I comprises a selection of works replete with biliographic references and comments, as also with biographic information and notes; List II, a number of miscellaneous works relating to the subject of the respective sciences in general, and to the history of organic materia medica, medicine, pharmacy and chemistry in particular.

[1] The above list of historical reference works was prepared by Dr. Hoffmann, of Berlin, Germany (Charlottenburg, Schlüter Str. 64), as a result of occasional inquiries and to save others the perplexities often experienced of finding in the mass of ancient, medieval and more recent literature, the most useful books for historical studies in the domains of medicine, pharmacy, materia medica and chemistry.—Editor.

These works afford a comprehensive survey of the pertaining literature from antiquity to modern times and offer valuable information conducive to the ready and proper choice of the literary resources best suited for historical research and study in the respective domains of knowledge.

LIST I.

IN CHRONOLOGIC ORDER.

Kurt Sprengel, "Versuch einer pragmatischen Geschichte der Arzneikunst." 4 vols. Halle 1792–1799. 4th edition. Leipzig, 1846.

T. F. Gmelin, "Geschichte der Chemie bis an's Ende des 18. Jahrhunderts." 3 vols. Göttingen, 1797–1799.

L. Choulant, "Handbuch der Bücherkunde für die ältere Medicin," zur Kenntniss der griechischen, lateinischen und arabischen Schriftsteller im aerztlichen Fache und zur bibliographischen Unterscheidung ihrer verschiedenen Ausgaben, Uebersetzungen und Erläuterungen. Leipzig, 1828. 2d edition under the title: "Geschichte der Literatur der älteren Medicin." Leipzig, 1841.

A. C. P. Callisen, "Medicinisches Schriftsteller Lexicon der jetzt lebenden Aerzte, Naturforscher, Apotheker, etc., aller gebildeten Völker." 33 vols. Kopenhagen and Altona, 1830–1845. (Replete with details concerning the literature of medicine, materia medica and natural sciences).

J. C. Poggendorff, "Bibliographisch-literarisches Handwörterbuch" zur Geschichte der exacten Wissenschaften, enthaltend Nachweisungen über die Lebensverhältnisse und Leistungen der Naturforscher aller Völker und Zeiten. 4 vols. Leipzig, 1858–1863.

H. C. Bolton, "A Select Bibliography of Chemistry," from the year 1492 to 1892. Washington, D. C., 1893. Supplement, 1899.

LIST II.

Lassen, "Indische Alterthumskunde." 5 vols. Bonn, 1847. 2d edition. Leipzig, 1858–1862.

E. F. R. Rosenmüller, "Handbuch der biblischen Alterthumskunde." 4 vols. Leipzig, 1830–1831. (Vol. 1, pp. 1–347, describes the minerals and plants of the Bible.)

Möhsen, "Geschichte der Wissenschaften." 4 vols. 1810.

Whewell, "History of the Inductive Sciences" from the earliest to the present time. 3d edition. 3 vols. London, 1857.

A. H. L. Heeren, "Ideen über die Politik, den Verkehr und den Handel der vornehmsten Völker der alten Welt." 2 vols. Göttingen, 1793–1796.

W. Heyd, "Geschichte des Levante Handels im Mittelalter." 2 vols. Stuttgart, 1879.

I. C. Wiegleb, "Geschichte des Wachsthums und der Erfindungen in der Chemie" in der ältesten und mittleren Zeit. 2 vols. Berlin, 1790–1791.

I. C. Wiegleb, "Geschichte des Wachsthums und der Erfindungen in der Chemie" in der neueren Zeit. Berlin, 1790–1791.

J. Beckmann, "Beiträge zur Geschichte der Erfindungen." 4 vols. Leipzig, 1780–1803.

J. Beckmann, "A History of Inventions, Discoveries and Origins," translated from the German by Wm. Johnston. 2 vols. London.

H. Haeser, "Lehrbuch der Geschichte der Medicin." 3 vols. Jena, 1852. 3d edition. 1875–1882. (Replete with historical and bibliographic notes.)

J. F. Royle, "Essay on the Antiquity of Hindoo Medicine." London, 1837.

J. F. Royle, "Das Alterthum der Indischen Medicin." Uebersetzt von Wallach und Hensinger. Cassel, 1839.

Wüstenfeld, "Geschichte der arabischen Aerzte und Naturforscher." Göttingen, 1840.

A. Philippe und Ludwig, "Geschichte der Apotheker" bei den wichtigsten Völkern der Erde. 2d edition. Jena, 1858. (Replete with information on the history of pharmacy, pharmaceutical education and bibliography.)

J. Berendes, "Die Pharmacie bei den alten Kulturvölkern." 2 vols. Halle, 1891.

Dioscorides, "De materia medica libri quinque." Kühn's Collectio. Vol. 25. Edited by Curtius Sprengel. Leipzig, 1829.

C. H. Pfaff, "System der Materia Medica." 7 vols. Leipzig, 1818–1824. (Replete with references to earlier writings. Vol. 1, pp. 28–41, contains a list of the pertinent literature of the eighteenth century.)

F. A. Flückiger and Dan. Hanbury, "Pharmacographia." London, 1879.

F. A. Flückiger, "Pharmakognosie des Pflanzenreiches." 3d edition. Berlin, 1891. (Both these works contain in an appendix a list of earlier works and bibliographical references.)

E. Gildemeister and Fr. Hoffmann, "Die Aetherischen Oele." Berlin, 1899. (Replete with historical and bibliographic notes and references).

Ferd. Höfer, "Histoire de la Chimie," depuis les temps les plus reculés jusqu'à notre époque. 2 vols. Paris, 1869.

Hermann Kopp, "Geschichte der Chemie." 4 vols. Braunschweig, 1843–1847.

E. von Meyer, "Geschichte der Chemie." 2 edition. Leipzig, 1895.

Chr. G. Schmieder, "Geschichte der Alchemie." Halle, 1832.

Theophrastus, Eresius, "De Historia plantarum libri decem." Editio Wimmer. Lipsiæ, 1854.

Balfour, "The Plants of the Bible." London, 1885.

Woenig, "Die Pflanzen des alten Aegyptens." Leipzig, 1886.

Bretschneider, "On the Study and Value of Chinese Botanical Works." Foochow, 1870.

Hehn, "Kulturpflanzen und Hausthiere in ihrem Uebergange aus Asien nach Griechenland und Italien." 3d edition. Berlin, 1877.

Pritzel, "Thesaurus literaturæ botanicæ omnium gentium." Leipzig, 1872. (Contains on pp. 378–306 and p. 416 a list of the earlier American botanical literature.)

Kurt Sprengel, "Geschichte der Botanik." 2 vols. Leipzig, 1817.

Meyer, "Geschichte der Botanik." 4 vols. Königsberg, 1854–1857.

A BASIC REACTION OF AROMATIC AND FATTY ALDEHYDES.[1]

By Samuel S. Sadtler.

While carrying on some work on oils of orange and lemon, I found it very difficult to get accurate determinations of the citral in certain of these oils. They were so-called oleo-resins of orange and lemon, which contain a relatively large percentage of acid resins, and have not to my knowledge been, as yet, described. These oils are obtained by extraction with a volatile solvent, which seems to dissolve certain constituents from orange and lemon peel, which either

[1] Read at a stated meeting of the Franklin Institute, before the Chemical Section, and reprinted from advance sheets of the *Journal of the Franklin Institute.*

are not extracted at all, or else in smaller proportion by the processes of expression. It is recorded as a fact that the gravity of machine-expressed oil is greater than hand-pressed, and these oils are heavier than either.

With the use of sodium bisulphite for determining the aldehydes the addition compound forms partly in the aqueous layer and partly in the oily layer, and further work is very discouraging when this stage is reached. I soon tried sulphite of soda instead of the bisulphite. On heating a solution of this with the oil, the dihydrodisulphonate of sodium is formed, which is soluble in water, and two molecules of sodium hydrate are split off. Tiemann, in his work on the aldehydes of lemon-grass oil, pointed out that the reaction could be indicated by phenolphtalein, and by adding as olution of sulphurous acid from time to time, the end of the reaction could be known and the difference of volume of the oil could be told. This, however, is not a method that is capable of the greatest accuracy, and requires a special form of flask.

It occurred to me that the alkali formed in this reaction might be titrated for with standard acid, omitting the bicarbonate of sodium used by Tiemann. I first tried this with a standarized solution of sulphurous acid, but later found N / 2 HCl, or normal HCl, very satisfactory and more convenient. It seems to require the use of more sulphite solution, however, as the sulphurous acid reforms sulphite from the NaOH split off. I will try, however, at a future time, to take up all the details necessary in the determination of citral as a matter by itself, and speak of the general procedure more especially at present.

From other tests on the oils in question, I found that they contained considerable quantities of acid resin, which would, unless previously neutralized, interfere with the results. In fact, I found the acid resin of the orange oil almost sufficient to neutralize all the alkali formed. This difficulty was overcome by neutralizing these acids first with dilute caustic potash solution (N / 2KOH being convenient for the purpose, and if done quantitatively, might be interesting as part of a more or less complete examination of the oil) and rosolic acid solution as indicator, which will serve as indicator in the subsequent reaction.

Analyses were made with oil of orange, but until the mixtures of aldehydes of this oil are more fully studied, I will not refer to figures

obtained. If citral is not found to be the predominating aldehyde, the results would be of little value except as comparative.

For oil of lemon, 5 or 10 grammes are weighed into an Erlenmeyer flask, and after neutralization, 25 or 50 c.c. of a 20 per cent. sodium sulphite solution, depending upon the amount taken, is added. Before adding the sulphite solution, however, it is neutralized with a little N/2HCl, after being heated by immersion in a water bath. The sulphite solution used in these experiments required about ·75 c.c. of N/2HCl to neutralize at boiling temperature, with rosolic acid as an indicator. When the solutions were mixed a red color formed at once in the aqueous layer. This was discharged from time to time with N/2HCl. The flask is then heated and agitated frequently. The reaction is complete in about half an hour, if kept hot, and the layers mixed frequently. When the color is all discharged, or all but a very faint pink, which is not appreciably affected by a few drops more acid, the number of cubic centimetres of standard acid is noted. An emulsion forms, due to the neutralized resins, but that does not interfere with the reaction, if care is exercised.

The reaction, as written by Tiemann, is:

$$C_9H_{15}COH + 2H_2O + 2Na_2SO_3 = C_9H_{17}COH\,(NaHSO_3)_2 + 2NaOH$$

and is probably correct, as the amount of citral and sulphite is shown below to be in the ratio of 1 to 2.

The amount of standard hydrochloric acid used expressed in terms of citral, in the above ratio of one molecule of citral to two molecules of HCl, divided by the weight of oil taken, gives the percentage of citral.

Analyses of citral in lemon oil, by this method, gave in two determinations:

	Per Cent.
I.	5·24
II.	5·29

I believe results within one or two tenths of a per cent. can be gotten in every case, with a little practice, by this method.

To check the accuracy of this reaction, I made some known mixtures of citral, which was kindly furnished by Dr. Harry F. Keller, and separated lemon oil terpenes, previously freed from citral.

	Calculated.	Found.
I.	8·68	8·85
II.	12·11	12·15

The method was further checked by using some pure, well-crystallized vanillin (M. P., 81° C.). The phenolic hydroxyl of the vanillin was first neutralized with a little caustic potash solution until it became a faint pink, using a little rosolic acid, sulphite solution added and titrated hot with N/2HCl, having first neutralized the sulphite solution at water-bath temperature as in the case of citral.

	Calculated.	Found.
Vanillin	100·00	99·00

This was a rough check on the method, but as the vanillin had not been specially purified further examination of the reaction with vanillin, vanilla extract, and samples of vanillin mixed with coumain and acetanilid will be undertaken.

The reaction is almost complete in the cold with vanillin and merely needs heat to complete the reaction more quickly. Standing a short time might have given the same results.

The reaction seems to be immediate and complete with fatty aldehydes. It will indicate the presence of one part of formaldehyde in 1,000,000 parts of water and when contained in food products the formaldehyde can be detected in a distillate of the same. The writer was able to detect formaldehyde in a solid product, partly made from milk, by first distilling with steam, neutralizing any free acid in the distillate with alkali, adding neutral sulphite solution and indicated upon which the presence of NaOH found in the reaction is clearly shown and can be accurately titrated for by means of standard acid.

Besides detecting and determining formaldehyde in milk a neutral sulphite solution used as s reagent is very useful.

The presence of acetone may be detected in wood spirits and determine acetic aldehyde in grain spirits. I noticed that a sample of grain alcohol, which, even after being carefully distilled over lime, gave a very brown color when made up into alcoholic potash, gave a very strong red coloration when mixed with sulphite solution and phenolphtalein.

Acetone and higher ketones were found to react, but further work on the various applications of this reaction must be taken up with the various substances in detail.

Referring again to essential oils, the reaction seems to be applicable to any essential oil, the single or predominating constituent of which is known, such as cinnamon, bitter almond oil, lemon-grass oil, cassia, etc.

CORRESPONDENCE.

ALTERNATIVE FORMULAS.[1]

Ever since the change made in the official formulas of substituting parts by weight, and which was subsequently followed by metric apportionment, trade and professional interest in the Pharmacopœia has been withdrawn and transferred to commentaries. In other words, pharmacists, instead of indicating a preference for the work of authority, absolutely ignore it, and in its place we find the various dispensatories, companions, etc. Not that I would say aught against these most useful, indispensable repositories of information, for they do more toward instructing the student—educating him as it is usually expressed—than the Pharmacopœia. Each work should occupy a distinct field. The Pharmacopœia, however, must be a book of working formulas, and these as plain, simple and direct as science in her modesty can make them.

I would like to suggest that the Committee of Revision, in anticipation of the same conditions prevailing in the future which have predominated in the past, do all in their power to prevent a continuance of this plight. It has operated during the past two decades and presumably will continue unless steps are taken to overcome it, and with this end in view I advisedly suggest that alternative formulas in definite common weights and measures be presented as is done by the British Pharmacopœia. Not that I would favor aping that work, but that we exercise good, wholesome judgment in discriminating what is useful from that which is practically useless. The sale of copies of the last revision were in a measure satisfactory, but this was due almost entirely to the fact that schools of pharmacy and medicine insisted upon students securing it as a textbook.

To continue the work with the metric system alone is to wilfully relegate it to a place among useless publications.

Very respectfully,

F. M. GOODMAN.

CHICAGO, ILL., January 7, 1904.

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[1] The above is an open letter to the Board of Trustees of the United States Pharmacopœial Convention.—EDITOR.

AMERICAN PHARMACEUTICAL ASSOCIATION.

To the Editor of THE AMERICAN JOURNAL OF PHARMACY, *Philadelphia.*

MY DEAR SIR:—I have been directed by the Council of the American Pharmaceutical Association to notify the pharmaceutical journals of an unavoidable delay in the issue of the 1903 Report of the Proceedings. Professor Diehl was prevented by prolonged indisposition from completing his report on the progress of Pharmacy within the usual time, but, having fully recovered, is now busily engaged in the necessary work, and the book will in all probability be ready for delivery early in April.

May I ask you kindly to give publicity to this notice in the columns of your valued journal?

Very truly yours, CHAS. CASPARI, JR.,

BALTIMORE, January 21, 1904. *General Secretary.*

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

MODERN MATERIA MEDICA AND THERAPEUTICS. By A. A. Stevens. Third edition, greatly enlarged, rewritten and reset; 8vo, pp. 663. W. B. Saunders & Co., 1903. Cloth, $3.50 net.

There seems to be no end to the publication of books containing pretty much the same facts, the only difference being that the facts are presented differently. One is almost inclined to congratulate the man who has had no time to write books, as has been said of Schwendener, the great German botanist, but who has confined himself to his researches and teachings. The Germans excel us because each author tries to write something new, he works and sweats until he has produced a work of originality, freshness and interest. Many American works on materia medica and therapeutics are so much alike that it seems a pity that the author has wasted his time, and that the physician is tempted to buy them. It is true in the case of text-books that the student is saved the taking of notes, or rather gets all of the notes, but the value of this may be open to question.

In the present book the drugs are classified according to their pharmacological action, and there are a number of chapters on applied therapeutics treating of (1) acute infectious diseases; (2) constitutional diseases; (3) diseases of the blood and ductless glands;

(4) diseases of the digestive tract; (5) diseases of the respiratory system; (6) diseases of the circulatory system; (7) diseases of the kidneys; and (8) diseases of the nervous system. There is also a chapter on remedial measures other than drugs, as electricity, massage, movement therapy for locomotor ataxia, the Schott or Nauheim treatment, cold, heat, hypodermoclysis and infusion, enteroclysis, lavage of the stomach, bloodletting, phototherapy and X-ray therapy and lumbar puncture.

The work is clearly written and contains a great amount of valuable information.

Materia Medica Americana. By David Schöpf. Reproduced as No. 3 of the Bulletins of the Lloyd Library of Botany, Pharmacy and Materia Medica. J. U. and C. G. Lloyd, Cincinnati, Ohio. 1903.

This work of Schöpf is considered to be the rarest of American works bearing on the subject of American medicinal plants. It is interesting that the original, from which the present copy is produced, was found by Dr. Charles Rice in Italy and presented by him to the Lloyd Library.

An interesting biographical shetch of Schöpf, prepared by Dr. Ed. Kremers, accompanies this volume.

While some might question the wisdom of reproducing works of this kind, which are largely of historical interest, still, after all, it is to the earlier workers rather than their successors that the principal credit is due of recording and preserving the knowledge of medicinal plants and their uses. It has been much easier to rewrite the earlier work, which has been the starting point of the contemporaries and immediate successors of Schöpf, than to arrange the scattered facts into the first volume.

The Latin Grammar of Pharmacy and Medicine. By D. H. Robinson, with an introduction by L. E. Sayre. Fourth edition, with elaborate vocabularies, thoroughly revised by Hannah Oliver. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut Street. 1903.

The present edition retains the essential features of the earlier ones, but has been carefully revised. In accordance with the expressed wish of some pharmacists and physicians, the English method of the pronunciation of Latin has been explained. Professor Sayre has contributed chapters on prescription writing and chemical

terms, and has prepared a list of pharmaceutical and medical terms with their definitions.

The book is a good one and would make a valuable addition to every pharmacist's library, and should be in the hands of every clerk and student.

MISSOURI BOTANICAL GARDEN. Fourteenth Annual Report. St. Louis, Mo. Published by the Board of Trustees. 1903.

This volume contains besides the various reports of the officers of the Board and the Director, Dr. William Trelease, a valuable monograph on the genus Lonicera by Alfred Rehder, which is the first complete systematic treatment of this family since it was described by De Candolle. There is also a supplementary catalogue of the Sturtevant Prelinnean Library by C. E. Hutchings.

UNIVERSITÉ DE PARIS. ÉCOLE SUPÉRIEURE DE PHARMACIE. Theses for obtaining the degree of Doctor of Pharmacy of the University of Paris during 1902–1903.

The following theses have been published by graduates of the Superior School of Pharmacy of the University of Paris:

"De la Multiplicité des Produits fournis par un microbe pathogène," by Paul-Amable Antoine. The biochemical characteristics of the *Bacillus pyocyaneus* are given.

"Separation Quantitative de la Brucine et de la Strychnine," by Alexis Blancher. The author precipitates the alkaloids in acid solution by silico-tungstic acid, the salt formed is decomposed by ammonia and the displaced bases extracted by chloroform and weighed, nitric acid being afterwards employed in decomposing the brucine.

"Recherches Histologiques sur la Famille des Hypéricacées," by Georges Weill. A monogram on the inner morphology of the Hypericaceæ.

"Contribution à l'Etude chimique de l'Urine chez les Herbivores," by Eurgale Grotard. A chemical examination of the urine of various domestic animals.

"Etude des Hydrates de Carbone de Réserve de quelques graines de Palmiers," by Ernest-Henri Lienard. A chemical study of the reserve carbohydrates of some of the palm seeds.

"Etude sur l'Essence de Rue et sur la Methylnonylcetone," by

Denis-Honoré Carette. An investigation on the composition of oil of rue and methylnonylcetone.

"Recherches sur l'Appareil Sécréteur interne des Composées," by Marc-Alphonse Col. A study on the distribution of secretion reservoirs in the Compositæ and their importance in systematic work.

"De l'Extrait de Fougère Male," by Ed. Schmidt. A chemical, physiological, and pharmacological study of aspidium.

"Recherches sur la Famille des Oxalidacées," by Fr. Chauvel. A consideration of comparative morphology of this family together with the history from a botanical as well as economic point of view.

"Contribution a l'Etude de la Constitution du Tannin de la Noix de Galle," by Alexandre Vournasos. A monograph on the constitution of the tannin of nutgalls.

"Etude sur les Préparations Officinales des Loganiacées," by B. Hébert. A study of official preparations of nux vomica and Ignatia seed.

"L'Iodure d'Hexyle," by A.-Ch.-P. Lecorneur. A study of iodide of hexyl obtained from mannite.

"L'Acide Paraoxyphénylsalicylique et ses Sels," by Jean Faure. A thesis on paraoxyphenylsalicylic acid and its salts.

"Quelques cétones obtenues au moyen de l'acide caproïque normal," by G.-E. Poissonnier. A study on some of the ketones obtained from normal caproic acid.

"Sur quelques cétones dérivées du Métacymene," by François B. Reyes. A monograph on the ketones derived from metacymene.

"Méthode générale de préparation des Ethers Oxydes Phénoliques symétriques et dissymétriques," by E.-R. Lerat. On the symmetric and asymmetric oxide ethers of phenol.

Sinonimia vulgar y Cientifica de las Plantas Mexicanas. Arreglada por el Dr. José Ramirez, con la colaboracion del Gabriel V. Alcocer. Mexico: Oficina Typográfica de la Secretaría de Fomento. Calle de San Andres, num. 15. (Avenida Oriente 51.) 1902.

This is a very valuable book, containing nearly 10,000 synonyms and common names of Mexican plants. The author gives the correct botanical origin, family name and distribution of every plant. A valuable bibliography accompanies the work. There is a large amount of Mexican, Central and South American material in various

collections in the United States, the specimens only having common names; and this classification by Ramirez of Mexican plants, together with that of Peckolt on Brazilian plants, will be helpful in their identification. The work is of special interest to botanists and others interested in the plant products of Mexico.

OBITUARIES.

Dr. Henry Carrington Bolton.—A well-known chemist and occasional contributor to pharmaceutical journals, died in Washington, D. C., on November 19, 1903, in the sixty-first year of his age.

Dr. Bolton was born in New York, January 28, 1843. He graduated from Columbia College in 1862, and obtained his degree of Ph.D. from Göttingen some time after.

Dr. Bolton was a member of a number of scientific societies, a prolific writer, and a scientific investigator of acknowledged merit. At the time of his death he was connected with the Smithsonian Institution.

John Dwight, one of the pioneer manufacturers of sodium bicarbonate, was born in South Hadley, Mass. He died in New York on November 25, 1903, in his eighty-fourth year.

Mr. Dwight began the manufacture of sodium bicarbonate about 1846, with his brother-in-law, Dr. Austin Church, and succeeded in building up a very large and lucrative business.

Dr. Cyrus Edson.—At one time president of the old New York City Board of Pharmacy, and prominently identified with the manufacture of several well-known proprietary medicines, died in New York on December 2, 1903.

Dr. Edson was born in Albany, N. Y., he graduated from the College of Physicians and Surgeons, New York, in 1881. He was prominently identified with and occupied several important public positions.

Thomas P. Langdon.—At one time a member of the firm of Gilpin, Langdon & Co., Inc., died at his home in Baltimore, November 23, 1903.

Edward Leon Milhau.—One of the oldest and best known pharmacists of New York, died in New Brighton, Staten Island, at the home of his daughter, Mrs. Royden Vosburgh, May 26, 1903.

Mr. Milhau was born in New York City in 1834, and was a graduate and subsequently a member of the College of Pharmacy of the City of New York, which institution he served in several important official capacities. He was also a member of the American Pharmaceutical Association, joining in 1858.

EDWARD H. OGDEN, who was at one time actively engaged in the drug business in Philadelphia, died in Riverton, N. J., on December 9, 1903, in the seventy-second year of his age.

Mr. Ogden, an apprentice of Jenks & Ogden, was a graduate of the Philadelphia College of Pharmacy, Class of '53. He was in business for a number of years on Market Street below Seventh with T. Morris Perot, the firm name being T. Morris Perot & Co. At the time of his death Mr. Ogden was the President of the Francis Perot's Sons Malting Company.

CHARLES S. OGDEN, a brother of Edward H. Ogden, was at one time engaged in the wholesale drug business with the now venerable Vice-President of the Philadelphia College of Pharmacy, Wm. J. Jenks. Mr. Ogden was born in Philadelphia, November 21, 1822, and died January 12, 1904.

He was interested in a number of beneficial and relief associations, and despite his age, 82, still took considerable interest in local and municipal affairs.

ROBERT C. C. WALKER, a member of the firm of Powers & Weightman, died in Philadelphia on December 19, 1903, in his sixty-sixth year.

Mr. Walker was a graduate of the law department of Harvard University, and followed his profession for some years as a member of the Philadelphia Bar. He also occupied several important political positions.

Mr. Walker was admitted as a partner in the house of Powers & Weightman in 1893, and continued to take an active interest in its affairs to the time of his death.

HENRY MARTIN WHITNEY died at North Andover, Mass., on December 2, 1903, in his seventy-fifth year.

Mr. Whitney was an active member of the American Pharmaceutical Association, the Massachusetts State Pharmaceutical Association, the Boston Druggists Association. He was, for a number of years, president of the State Board of Pharmacy, and was also an ex-president of the American Pharmaceutical Association.

M. I. W.

PHARMACEUTICAL MEETING.

The fourth of the Pharmaceutical Meetings of the Philadelphia College of Pharmacy, of the present series, was held on Tuesday afternoon, January 19th, at 3 o'clock. Mr. E. M. Boring, a member of the Board of Trustees, presided.

The first speaker was the well-known manufacturer of thermometers, Mr. Gustavus Pile, of this city, who read a paper on the subject of "Thermometers," which was illustrated with models of the earliest forms used, as well as those of more recent manufacture, some of which he presented to the College. In addition to the paper, Mr. Pile also remarked concerning the earlier systems of weights and measures in which the divisions appeared to be in eighths and fourths in contrast to the decimal system later adopted. In regard to the boiling point of water he said that the deviations in the barometer made a difference of as much as two to three degrees. Mr. Pile also spoke of the difficulty of blowing bulbs of the correct size, particularly in attempting to make a new bulb for an old scale, and said that a glass-blower might work several days before he made a bulb of the proper size. In using thermometers it is important to heat the whole length of the tube, as in their construction they are surrounded by steam. He pointed out that the value of mercury over alcohol in the construction of thermometers was (1) that it will record a much higher temperature; (2) that it possesses a uniform rate of expansion for each increment of heat; (3) it is more easily freed from air; and (4) has a greater conducting power. The alcohol used in spirit thermometers is 95 per cent., wood alcohol answering the purpose as well as grain alcohol.

Mr. Pile referred to the ignorance of many people with regard to the use of thermometers, and related an incident of a physician in whose hands a clinical thermometer always registered 101°, due to the fact that the mercury was held in the tube and the physician was not sufficiently informed to shake it down before using the thermometer. He showed an order which he had received which read as follows: "Kindly express us at once one Foreign height thermometer for factory use."

Mr. Boring said that the presence of Mr. Pile took him back to the time when his father, Dr. W. H. Pile, came to these meetings and presented papers of both chemical and pharmaceutical interest

as well as those relating to his own specialty, that of making instruments of precision for chemical, pharmaceutical and medical work.

The subject of clinical thermometers was brought up by Mr. Boring, who said that many persons had an impression that a two-minute thermometer was not reliable, because they do not give it time to respond. In reply to Dr. Lowe, Mr. Pile said that the one-minute thermometers were of thinner glass, and therefore conducted the heat more rapidly. Mr. Pile said that owing to the variation in thermometers, particularly those used for clinical purposes, the Government at Washington had asked all manufacturers to send their standards for comparison, as there is considerable difference in the expansion of different kinds of glass as well as a difference of expansion of mercury and glass. In this connection, Mr. Wilbert stated that the Bureau of Standards at Washington offer to standardize clinical thermometers for pharmacists at the rate of six for twenty-five cents each, and that the work is quite accurate.

On motion of Mr. Wiegand, a special vote of thanks was tendered Mr. Pile for his paper and the apparatus which he presented.

A paper on "Some Rare Fixed Oils," by Dr. George R. Pancoast and Willard Graham (see page 70), was presented by Mr. Graham. In the discussion of this paper Mr. Boring asked if oils of the various nuts were articles of commerce, to which Mr. Graham replied that they were but were not easily obtainable. Mr. Boring also spoke of an early experience of his in making fluid extract of ergot. He said that he followed the U.S.P. directions and packed the drug very thoroughly in the percolator and obtained at first a colorless liquid which was the oil of ergot. He also stated that they used to powder the ergot in cold weather. Dr. Lowe called attention to the fact that the German Pharmacopœia directs the oil of ergot to be extracted from the drug before using it. Mr. Wiegand called attention to some experiments that were made by the late Mr. Charles Bullock on the oil of nux vomica and said that the oil gave the alkaloidal reactions.

Mr. Wilbert read a paper on "Lime Water" (see page 66) and exhibited some specimens of commercial oyster-shell lime. Mr. Boring said that if he was not mistaken Professor Procter recommended the filtering of lime water. Mr. Wiegand said that his custom had been to remove the lime water by means of a syphon,

as he considered the air, on account of the carbon dioxide, to be prejudicial.

Mr. Boring said that his method was to make 5 gallons of lime water at a time, keeping it in half-gallon bottles, which are tightly stoppered, and the solution being filtered as wanted. Mr. William McIntyre said that he followed the usual method of using the lime over again and marking the lots as they were decanted, and he thought that the second lot was better than the first. Mr. C. H. LaWall said that most pharmacists considered that as long as there was any precipitate in the stock bottle that it could be employed for making lime water. Mr. Boring called attention to the fact that some pharmacists make up large quantities of lime water, dispensing it from containers which are not air-tight, and which they give away free of charge. This custom is to be deprecated not only on account of the worthlessness of the product, but because good lime water requires care in its preparation and the pharmacist should be recompensed for his skill.

James W. Gladhill presented a paper on the "Examination of Commercial Peppers," which was illustrated with a large number of specimens (see page 71). Dr. Lowe referred to the fact that hard-tack was used at one time as an adulterant of pepper. Professor Kraemer stated that at the present time some of the cheaper grades of ground pepper which he had examined contained the endocarp or stone of the olive, cayenne pepper and pepper hulls, and showed by means of drawings how these adulterants might be quite easily detected by the use of the microscope.

Mr. Gladhill commented on the Government standards for pepper; and also said that the decorticated black pepper was largely used for making commercial ground white pepper.

Some remarks, on the making of paste for the pharmacist's use, were made by Professor Lowe, who said that he found a paste consisting of equal parts of the following: Powdered acacia, tragacanth and dextrin, to be quite satisfactory, *i. e.*, yielded a paste which, though adhesive, permitted the labels to be easily removed. He also recommended the flour paste, the formula for which is given in Remington's Practice of Pharmacy. He stated that in his store they had some trouble recently in making this paste from some of the commercial flours, as it would not properly thicken, and found

that Millbourne flour was the most satisfactory. He also referred to the importance of pasting labels on bottles and packages.

At the next meeting, February 16th, the following provisional programme will be presented:

"Technical Analysis of Water," by W. E. Ridenour.

"Some Refined Methods in Water Purification," by Wm. G. Toplis.

"The Chemical and Bacteriological Analysis of Water, with Interpretation of the Results," by Dr. Albert Robin, Wilmington, Del.

"Progress in Pharmacy—a Quarterly Review," by M. I. Wilbert, Ph.M.

HENRY KRAEMER,
Secretary.

THE PHILADELPHIA COLLEGE OF PHARMACY.

The quarterly meeting of the members was held December 28th, at 4 P.M., in the library. The President, Howard B. French, presided.

Thirteen members were present.

The minutes of the semi-annual meeting held September 28th were read and approved.

The minutes of the Board of Trustees for the meetings held September 1st, October 6th and November 5th, were read by the registrar, and approved.

Mr. Beringer, for the Historical Committee, reported verbally that the work was going on; the enquiries were being mailed and replies were being received. The card index was completed; the amount appropriated was nearly exhausted, principally for postage.

Mr. Rumsey, for the Committee on Membership, presented a list of names for election to honorary membership in the College in recognition of their distinguished services in the professions of medicines, pharmacy and allied sciences. The report was received and approved.

The President announced the death of Dr. William H. Webb, who was a graduate of the Class of 1868 and a member of the College since 1868. Dr. Webb had practised medicine for many years in Philadelphia. His death occurred on December 20th.

Mr. Krewson announced the death of Gustav A. Appenzeller, Class of 1877, and Edward H. Ogden, Class of 1853. These gentlemen were not members of the College but were well known in the city, and it was fitting that a record of their deaths should be made.

The thanks of the College were tendered to H. K. Mulford & Co. for their donation of vaccine virus and shields used in the recent vaccination of the students.

C. A. WEIDEMANN, M.D.,
Secretary.

PERSONAL NOTES.

C. LEWIS DIEHL, Professor of Pharmacy in the Louisville College of Pharmacy, has retired from the retail drug business and will in the future devote himself to his literary and professional work. Professor Diehl has had an interesting career. He was apprenticed to the late Dr. John R. Angney, Fifth and Spruce Streets, Philadelphia, in April, 1858, and graduated from the Philadelphia College of Pharmacy in March, 1862. Then, until the early fall of 1862, he had charge of the laboratory of John Wyeth & Brothers, who at that time had large army contracts, and he may thus claim to have been their first chemist in the manufacturing line—leaving them only because he considered it his duty to serve in the Army. Having returned early in 1863, discharged on account of wounds, he secured a position as chemist under Maisch in the U. S. A. Laboratory at Sixth and Oxford Streets, in Philadelphia, remaining until January, 1865, when it became evident that the work in the laboratory would languish, or cease. Taking his way to Chicago, which he at that period claimed as his home, he secured a position with the firm of Bender, Mahla & Co., manufacturing chemists, but left them in July, having received an invitation to reorganize and manage the Louisville Chemical Works, an enterprise which had been called into life by the late Dr. J. Lawrence Smith and organized by the late Dr. Edward R. Squibb. He remained in charge of this concern until January, 1869, when, owing to a business disagreement of the owners, the Chemical Works passed into other hands, and he severed his connections with them.

In the early summer of 1869 he purchased a store at the southwest corner of First and Walnut Streets, Louisville, where he continued until June, 1874, when he sold out, preparatory to opening the store at Third and Broadway, which he has recently (November 28th) disposed of with the intention of relinquishing active participation in the practice of pharmacy.

Professor Diehl joined the American Pharmaceutical Association in 1863 and attended its meetings for the first time at Detroit in 1866. He was elected chairman of the Committee on the Progress of Pharmacy, and re-elected at New York in 1867. He made a volunteer report on the Progress of Pharmacy at Richmond in 1873, in consequence of the inability of the chairman, elected at Cleveland, to serve; was elected to the newly created office of Reporter on the Progress of Pharmacy, and re-elected annually until 189', when he declined re-election; but was again elected in 1895, and annually since then. In 1874 he had the honor of being elected President of the Association, holding that office in addition to that of Reporter.

In 1871 Professor Diehl assisted in organizing and establishing the Louisville College of Pharmacy, served as its President during the first decade, and also as one of its teachers for many years—resigning as Professor of Pharmacy about the middle of the eighties, but again entering upon its duties in 1894. He was a member of the Kentucky Board of Pharmacy for quite a number of terms—serving on the first board appointed under the law, and is now a member, serving a second consecutive term of five years, after having been out of the board for quite a period. He has also been a member of the Kentucky Pharmaceutical Association from its birth, and honored by being elected its President several years ago.

Professor Diehl has also been connected with the Revision of the United States Pharmacopœia for many years. He was elected a delegate to the Convention of 1870, from the Chicago College of Pharmacy, of which institution he was then a member, and subsequently delegated by the Louisville College of Pharmacy to the Pharmacopœial Conventions of 1880, 1890 and 1900, serving now his third term as a member of the Committee of Revision of the U.S.P.

FRANK G. RYAN, formerly Instructor in Pharmacy in the Philadelphia College of Pharmacy, and for the past four years chief pharmacist for Parke, Davis & Co., having supervision over the manufacture of all their chemical, pharmaceutical and biological products, was recently elected to the Board of Directors of that firm, which position was made vacant by the death of Mr. Warren, late general manager.

THE SOCIETY OF PHARMACY OF PARIS.—The following corresponding members were elected at the annual meeting of the society: Professor Bruylants, University of Louvain; C. Burhen, Clarens (Switzerland); Codina y Langlin, Barcelona; Professor Dambergis, Institute of Pharmacy of Athens; Prof. Donald MacAlister, University of Cambridge; Mr. Dulière, Brussels; Professor Greenish, London School of Parmacy; Professor Greshoff, Harlem; Mr. Poulsson, Christiana; Mr. Roemers, Aarhus (Denmark), and Mr. Waller, Vexio (Sweden).

GUSTAV PFINGSTEN, editor of *Deutsche-Amerikanische Apotheker-Zeitung*, died at his home in New York City on January 7th. He was born in Ranzel, near Cologne, May 25, 1843, and studied in Germany, coming to this country in 1869. He received the degree of M.D. from the New York University Medical College in 1889. He entered the drug business soon after coming to this country, and continued the same until the time of his death. He was very active in the work of the German Apothecaries Society, with which organization he became early allied, being president for two terms, and was editor of the organ of the society since 1896.

PHILADELPHIA ASSOCIATION OF RETAIL DRUGGISTS.—At the annual meeting of the association, held January 8th, the following officers were elected for the ensuing year: President, Thomas H. Potts; Vice-Presidents: William L. Cliffe, William E. Lee and David J. Reese; Recording Secretary, Nathan A. Cozens; Financial Secretary, Carl W. Shull; Treasurer, George W. Fehr. Executive Committee: A. T. Pollard, W. H. Gano, Charles Leedom, Richard H. Lackey, H. C. Blair, A. J. Frankeberger and H. A. Nolte.

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METHODS AND INTERPRETATION OF WATER ANALYSIS.

By A. Robin, M.D.,
Bacteriologist to City Water Department, Wilmington, Del.

The average consumer judges of the quality of the drinking water by means of his special senses of sight, smell and taste. Water which is turbid or emits a disagreeable odor is unreservedly condemned, while clear, sparkling water free from odor is just as unqualifiedly pronounced "pure." Those of us who are familiar with the history of typhoid epidemics and have had opportunity to examine drinking waters by means of special methods know how fallacious such a crude judgment is. Water that is clear and sparkling may contain the germs of typhoid fever or may be polluted with sewage which, in the course of decomposition, gave rise to carbonic acid. It takes many billions of bacteria to render a glass of water perceptibly turbid, and it requires considerable fresh sewage to impart to it a fecal odor. On the other hand, a turbid water, although objectionable from an esthetic point of view, may be entirely wholesome, and a disagreeable odor may be due to inoffensive vegetable compounds or harmless algae.

This evident inability to form a ready judgment of the quality of a drinking water has led the sanitarian to seek the aid of the chemist, who, it was supposed, could readily detect by means of chemical analysis the injurious substances in the water under suspicion. However, it soon became evident that a chemical analysis of water for sanitary purposes differs essentially from any other kind of

analysis which the chemist may be called upon to make. The finding of arsenic or some poisonous alkaloid in a suspected fluid is decisive, and a report on such finding is merely a statement of fact. In the analysis of water, on the other hand, the findings are purely relative and must be properly interpreted before they can be of any value. A drinking water, if I may borrow the legal phraseology, is indicted on circumstantial evidence, and it depends on the erudition and ability of the chemist to so interpret and connect the evidence as to make out a clear case for or against the suspected water.

The object of a chemical analysis of water is to discover whether or not pollution with objectionable organic impurities has taken place. By "objectionable organic impurities" we understand those which are from human or animal sources and are capable of conveying the germs of disease. In other words, we look principally for fecal contamination, inasmuch as the germs of typhoid fever, cholera, dysentery and other intestinal disorders are excreted with the feces and together with the feces gain access to the water. By itself, organic matter in the minute quantities in which it is present in water, is not injurious to health, even if derived from sewage. It is only because this organic matter may be the carrier of disease germs that it becomes a matter of serious consideration. Therefore, organic matter derived from plants or vegetables removed from the possibility of infection with disease-producing bacteria has no significance from a sanitary standpoint, and its presence in drinking water in no way renders it unwholesome.

It is thus evident that the aim of the sanitary chemist is to discover, first, the presence of organic matter, which would indicate pollution, and, second, to determine the source of this organic matter. How well these two requirements are fulfilled by a chemical analysis will be made clear later.

Dead organic matter in water, as elsewhere, is not in a state of stability. Through the agency of certain bacteria, in the presence of oxygen, it continuously undergoes material changes, becoming resolved into simpler inorganic compounds. The nitrogenous substances are converted into ammonia, and the latter into nitrous and finally nitric acid, the two acids combining with bases usually present to form nitrites and nitrates, respectively. These changes may be best illustrated by the following scheme:

$$\text{Organic matter}\left\{\begin{array}{l}\text{Carbon---Carbon dioxide.}\\ \left.\begin{array}{l}\text{Hydrogen}\\ \text{Nitrogen}\end{array}\right\}\text{Ammonia}\left\{\begin{array}{l}\left.\begin{array}{l}\text{Nitrous acid}\\ \text{(Nitrites)}\end{array}\right\}\text{Nitric acid (Nitrates).}\\ \text{Water}\end{array}\right.\end{array}\right.$$

This process, may it be remarked in passing, is a beneficial one, since by its means purification of polluted water is accomplished and the decaying organic matter converted into useful plant food.

These changes, under favorable conditions, take place incessantly so long as there is a supply of dead organic matter and the necessary bacteria are present. Therefore, the amount of organic matter in water represents that portion which has not yet undergone disintegration—the organic nitrogen or so-called albuminoid ammonia—as well as the various intermediary products of the portion which has undergone or is undergoing disintegration—free ammonia, nitrites and nitrates. The quantitative relation of these products of oxidation to each other as well as to the unoxidized nitrogenous matter will depend on the original amount of the organic matter and the rapidity with which oxidation has taken place. Therefore, an analysis which discloses these various stages of oxidation reveals also not only the presence but the retrogressive course of the organic matter. Given a water containing relatively large amounts of albuminoid and free ammonia, together with nitrites and nitrates, the indications would be that such water contains a large amount of organic matter in a state of incomplete oxidation; in other words, the contamination is recent. On the other hand, the presence of nitrates, in the absence of nitrites, with only small amounts of free and albuminoid ammonia, would indicate complete oxidation or a previous pollution. It goes without saying that pure water should contain only traces of albuminoid and free ammonia and should be free from nitrites and nitrates, the latter, if in small quantity, being rapidly appropriated by the water plants. It is to be expected that in deep wells removed from the possibility of pollution, the water will contain very slight amounts of ammonia and no nitrites or nitrates, or mere traces, although free ammonia may sometimes be present in large amounts as a result of oxidation of vegetable matter or nitrates by ferric oxide.

In addition to organic matter, water contains various salts, the most important and constant of which is sodium chloride or, occasionally, magnesium and calcium chloride. These chlorides are derived from the sea or geological formations rich in salts. The

amount of chlorides will vary with the natural source and remains fairly constant. However, when the water is polluted with sewage or household refuse the chlorides will increase in proportion to the degree and nature of the pollution, and this increase serves as a reliable indication of past or present pollution. This index, however, is of value only when the normal chlorine contents of the water in question or of waters in the immediate neighborhood is known.

On the foregoing considerations are based the various methods employed in the chemical analysis of water. As these methods are fully described in books on the subject, I shall not dwell on them here, but will mention the modifications which I found useful in my work. For the determination of turbidity, free and albuminoid ammonia, nitrates, nitrites and iron I employ Jackson's standards, which are used in the Mt. Prospect Laboratory, Brooklyn, and are described by Mr. Jackson in the *Technology Quarterly*, Vol. XIII, No. 4, 1900. A constant use of the standards convinced me of their accuracy and convenience. They offer the great advantage of being always on hand and presenting a uniformity of composition (color) not attainable when the standards are made up extemporaneously. However, in the determination of turbidity I depart somewhat from Mr. Jackson's recommendations and make use of 100 c.c. xx tincture bottles, glass stoppered (W. T. & Co.), instead of 100 c.c. Nessler tubes. I found that by means of these bottles it is possible to determine the turbidity with much greater accuracy. In determining nitrates and nitrites I treat 200 c.c. of the water with an excess of precipitated and washed aluminum hydrate, decanting the clear supernatant fluid. This brings about complete decolorization of the water, a condition most desirable in the case of surface waters which are frequently colored, the color interfering with the proper determination of nitrites and nitrates. I do not determine the loss on ignition for the reason that it is not a reliable method of determining the organic matter in the residue. When the latter is subjected to heat, the nitrates are decomposed and the chlorides volatilized to a considerable extent, while some salts retain the water of crystallization despite the heating. The loss on ignition, therefore, does not represent the amount of organic matter burned. I do, however, heat the residue, but only to observe the charring on ignition. The degree of charring of the residue does indicate, roughly, of course, the amount of organic matter.

UNRELIABILITY OF CHEMICAL DATA.

There are a number of serious objections to the data obtained by a chemical analysis. (1) Excessive free ammonia in ground waters may be the result, as has been mentioned, of the oxidizing action of iron or other metals on the nitrates present, while in surface waters it may be produced by the action of a fungus Crenothrix (Brown). (2) The nitrites found in deep-well water may be the result of the reduction of nitrates normally present in the soil and, consequently, in no way represent organic pollution. One of the chief objections, however, is that a chemical analysis does not reveal the nature of the organic matter, whether of vegetable or animal origin. Admitting that a certain water contains an excess of organic matter, the question arises, Does this organic matter represent harmless vegetables or dangerous sewage? The chemist cannot answer this question with a certainty which would preclude a "reasonable doubt." Yet a water contaminated even with large amounts of vegetable matter, while not the best kind of water to drink, is, nevertheless, free from danger. It is true, that if the ammonia on distillation is given off rapidly and the nitrites and chlorine are excessive, the indications that the organic matter is derived from sewage are reasonably clear, but the rapidity with which ammonia even from animal matter is given off is only comparative and there is no way of gauging it, while the excessive amount of chlorine as compared with the normal chlorine standard of that particular locality presupposes a previous study of unpolluted waters which is seldom made and which often cannot be made.

The other objection, one of a much more serious nature, is that water may be organically pure and yet contain germs of disease. Instances are cited by a number of authors showing that water-supplies pronounced on chemical evidence to be above suspicion have been proved to have caused serious epidemics of typhoid fever or dysentery. Thus Dr. Thresh, in his well-known book on "Water and Water Supplies," cites a number of such instances, a few of which I will quote.

The water from the river Ouse, below where it receives the sewage of Buckingham, to which an epidemic of typhoid fever was attributed, was analyzed by the public analyst, who reported that it "does not appear from the analysis to contain sewage matter."

The Beverley water-supply, which became polluted with infected sewage from an asylum, giving rise to a typhoid epidemic, was pronounced by the chemist to be "of a very high degree of purity, and eminently suitable for drinking and domestic purposes."

Analysis of water from the sewage-polluted Trent showed that "there is no evidence of the product of sewage contamination."

The well-water supplying Houghton-le-Spring became contaminated with sewage from a farm, causing a sudden outbreak of typhoid fever. The chemist who analyzed the water reported that "this water is very free from indications of organic impurity. . . . It is a good water for drinking purposes."

The reason for this evident failure on the part of the chemist to detect dangerous pollution is not difficult to find. A generally pure water may become contaminated with an amount of sewage too small to give evidence of its presence when diluted with several million gallons of water, yet this small amount of sewage may contain numerous specific germs the presence of which cannot be detected by a chemical analysis. Again, the sewage may have undergone complete oxidation and the end products taken up by the plants, leaving no perceptible evidence of the pollution, while many of the specific germs which may have been present in the original sewage remain viable and capable of causing disease.

Before leaving this phase of the subject, I wish to point out the value of chemical analysis in comparing different waters in the same locality or a certain water at different times. In this connection, the data obtained by a chemical analysis are both accurate and valuable. Also in the study of filtration, especially of the slow-sand type, chemical analysis of the raw water and effluent made from time to time furnishes valuable evidence of the efficiency of the filter in removing turbidity and color, and bringing about the nitrification of organic matter which is the essential feature of this process of water-purification.

BACTERIOLOGICAL EXAMINATION.

With the advent of bacteriology, and especially after the introduction of Koch's plate method of isolation of bacteria, the hope of the sanitarian had been revived. It was supposed that at last we have a method by means of which we may detect the specific causes of disease in water, and thus place the examination of water on the

same certain basis as the detection of poisons. With the knowledge that typhoid fever is usually caused by the drinking water and after the discovery by Koch that cholera is of similar origin, it was expected that the typhoid bacilli and the cholera spirilla could be detected in the suspected water. Unfortunately, disappointment followed all attempts in this direction. It soon became evident that while a certain water has been the cause of either a cholera or typhoid epidemic, as established by all evidence at hand, neither the cholera spirillum or the typhoid bacillus could be detected in such waters. The cause for this failure was found in the great predominance of water bacteria which overgrow and obscure the few specific parasites, rendering their discovery impossible. The effort may be compared to looking for a needle in a haystack. While not entirely abandoned, the search for specific microorganisms has not been made the object of routine examinations; and until some satisfactory method is devised by which the saprophytic bacteria may be entirely eliminated and the number of the specific microorganisms increased so as to have them present in very small quantities of the water, the bacteriologist must depend upon other data upon which a conclusion as to the quality of the water may be reasonably based. It was thought for a time that the number of bacteria in the water could serve as an index of pollution, and a number of standards of bacterial purity have been suggested by various authorities. Thus, Koch considers 100 bacteria per cubic centimetre as the safe limit for drinking water; Miquel raises the standard to 1,000; Crookshank agrees with this standard, while Macé and Migula claim that 250 to 500 bacteria is the highest limit for a good drinking water. These or any other arbitrary standards based on mere number of bacteria are as fallacious as the "standards" proposed from time to time for ammonias, nitrites, nitrates, etc. In the first place, the number of bacteria in water will vary greatly with the medium, the reaction of the medium, the length of time the colonies are allowed to develop, dilution, etc., as may be seen by the following data:

(1) *Time of Plating.*—It makes considerable difference whether the water is plated immediately upon collection or is allowed to stand for some time before plating. At room temperature, the bacteria multiply enormously, so that if the plating is done several hours after collection of the sample, an originally pure water may be condemned on the bacterial count. On the other hand, if packed in

ice, the bacteria decrease in number sometimes to a very marked degree. This is clearly shown by Jordan and Irons (*Trans. Am. Pub. H. Ass.*, Vol. XXV, 1899) in the following table:

	A.		B.		C.	
	Temp. C°.	No. Bacteria per 1 c.c.	Temp. C°.	No. Bacteria per 1 c.c.	Temp. C°.	No Bacteria per 1 c.c.
Immediately after collection	20·75	176	23·5	950,000	29	385,000
After 3 hours	9	123	9	510,000	29	. . . . . .
" 6 "	6	93	6	90,000	(4 hrs.) 66	130,000
" 11 "	8	87	6	430,000	(8 hrs.) 2	210,000
" 24 "	7	72	7	380,000	(22 hrs.) 6	136,000
" 32 "	8	46	8	340,000	. . . . . .	. . . .
" 49 "	4	27	2·5	429,000	(46 hrs.) 8	305,000
" 72 "	1	39	3·5	480,000		

This marked decrease the authors ascribe to the effect of sudden chilling.

(2) *Dilution.*—It is by no means a matter of indifference whether the water is plated as it is or diluted; also the degrees of the dilution employed has an effect on the number of bacteria per 1 c.c., as shown by Jordan and Irons (*l. c.*) in the following table:

A.		B.	
Undiluted	218	Diluted 1–1,000	844,000
Diluted 1–10	470	Diluted 1–10,000	2,630,000
. . . .		Diluted 1–100,000	4,300,000
C.		**D.**	
Undiluted	1,500	Diluted 1–1,000	479,000
Diluted 1–10	4,340	Diluted 1–10,000	1,120,000
Diluted 1–100	8,800	Diluted 1–100,000	1,300,000

This variation in number, dependent on dilution, is due to the obscuration of colonies through inhibition of growth when undiluted water is plated. In the matter of dilutions, the number and vigor of shakes to which the vessel is subjected before the 1 c.c. is with-

drawn affects the numerical results, also whether distilled or tap-water is used as a diluent. The method I employ is to have on hand 50 and 100 c.c. graduated flasks half-full of tap water. These are sterilized in the autoclave. One cubic centimetre of the water is added to either the 50 or 100 c.c. flask, and contents subjected to ten vigorous shakes. The flask is then filled to the mark with sterile tap-water and inverted twenty-five times. If higher dilutions are required portions of diluted water are similarly treated.

(3) *Composition of Media.*—That the constituents, reaction and character of the medium influence the number of bacteria to a very great extent is a well-known fact attested by numerous experimental data. The marked variations in the number of bacteria in the same water plated on different media is shown by the following data obtained by Jordan and Irons (*l. c.*):

(1) SURFACE WATER (LAKE MICHIGAN).

	Reaction (Fuller's scale).	No. of Colonies. Eight days.
Ordinary Witte's peptone agar	+10	50
Ordinary Witte's peptone gelatin	+10	130
Somatose gelatin (no broth)	0	110
Nährstoff Heyden gelatin (no broth)	0	460
Somatose agar (no broth)	0	470
Nährstoff Heyden agar (no broth)	0	570

(2) SURFACE WATER (MISSISSIPPI RIVER).

	Reaction (Fuller's scale).	No. of Colonies. Seven days.
Ordinary Witte's peptone agar	+10	206
Somatose agar (no broth)	0	543
Nährstoff Heyden agar (no broth)	0	612

(3) SEWAGE (DILUTED $\frac{1}{10000}$).

	Reaction (Fuller's scale).	No. of Colonies. Ten days.
Witte's peptone agar	+10	127; 127
Somatose agar	0	198
Nährstoff Heyden agar	0	355; 342

(4) GROUND WATER (ARTESIAN WELL).

	Reaction (Fuller's scale).	No. of Colonies. Nine days.
Ordinary Witte's peptone agar	+10	15
Ordinary Witte's peptone gelatin	+10	21
Nährstoff Heyden gelatin	0	700
Somatose agar	0	584
Nährstoff Heyden agar	0	920

Equally marked variations were obtained by Gage and Phelps (*Centralbl. f. Bakt.*, *Paras. u. Infek.*, Abt. 1, Bd. xxxii, No. 12, 1902; *Trans. of the Am. Pub. H. Ass. of the Twenty-ninth Annual Meeting*, 1901). They experimented with thirteen different media and various waters. Fuller and Johnson (*Trans. Am. Pub. H. Ass.*, Vol. XXV, 1899) experimented with a medium composed of meat infusion and 12 per cent. gelatin, omitting the peptone and salt, with the following comparative results:

NUMBER OF BACTERIA PER CUBIC CENTIMETRE.

Reaction (per cent).	Regular Nutrient Gelatin.	Meat Infusion and Gelatin.
0·0	110	200
0·5	110	210
1·0	120	100
1·5	80	130
2·0	75	70

This table also shows the effect of the reaction. The optimum reaction in this case was + 0·5 for the meat infusion gelatin and + 1·0 for the regular nutrient gelatin. The optimum reaction, however, will differ with different waters. Generally + 10 to + 15 (Fuller's scale) is recommended. In my own experimental work I found equally striking variations as shown in the table, page 111.

The gelatins Nos. 1 and 9 were prepared according to the directions given by the Laboratory Committee of the American Public Health Association on Standard Methods. Gelatin No. 2 was prepared in accordance with the same method, with the exception that Armour's extract of beef was used instead of meat. The reaction in each case was + 15. An extended series of observations on the Gelatins Nos. 1 and 2 showed that the latter invariably gave twice the number of bacteria.

(4) *Condition of Cultivation.*—An atmosphere saturated with moisture, as shown by Whipple (*Technology Quarterly*, Vol. XII, No. 4, December, 1899), favors a greater development of bacteria. The temperature also plays an important role, since fewer bacteria will develop at 10° C. than at 20° C. The difficulty of maintaining a constant low temperature is well known.

(5) *Length of Cultivation.*—The day on which the colonies are counted influences the numerical results, perhaps, more than any

Series.	Medium.	Day of Count.	No. Bacteria per 1 c.c.
A	Gelatin No. 1	2	3,000
	" " 2	2	8,000
	Nährstoff Heyden agar	10	55,000
B	Gelatin No. 1	2	10,000
	" " 2	2	24,000
	Nährstoff Heyden agar	10	30,000
C	Gelatin No. 2	2	87,000
	Nährstoff Heyden agar	10	172,000
D	Gelatin No. 2	2	70,000
	Nährstoff Heyden agar	10	108,000
E	Gelatin No. 1	2	8,000
	" " 2	2	14,000
	Nährstoff Heyden agar	10	53,500
F	Gelatin No. 1	2	2,350
	" " 2	2	4,800
	" " 9	2	2,150
	Nährstoff Heyden agar	10	8,850
G	Gelatin No. 1	2	2,050
	" " 9	2	4,750
	Nährstoff Heyden agar	10	31,500

other factor. Given a certain medium and environment, some species of bacteria will develop more rapidly than others. I could illustrate this fact by numerous instances, but will cite only a few from my own records:

Gelatin	plates,	third	day	count	3,050
"	"	fourth	"	"	5,350
"	"	third	"	"	4,750
"	"	fourth	"	"	12,150
"	"	second	"	"	8,000
"	"	third	"	"	50,000
"	"	second	"	"	2,350
"	"	sixth	"	"	4,500
"	"	second	"	"	4,800
"	"	sixth	"	"	13,150

Gelatin plates, second day count	2,150
" " sixth " "	7,350
" " second " "	2,050
" " sixth " "	11,000

The committee of the American Public Health Association on Standard Laboratory Methods recommends that plates be counted on the second day. The difficulty, however, of establishing a uniform practice lies in the variability of saprophytic bacterial species not only in different waters, but in the same water at different times. Thus a certain water may contain species which develop rapidly at 20° C., while another water, or the same at another time, may contain species which develop slowly at that temperature. As a matter of fact, waters containing large numbers of bacteria whose optimum temperature is 37° C. (fecal and other pathogenic organisms) will show a lower count, owing to the fact that these species develop slowly at 20° C., and the colonies could be readily overlooked on the second day count. In the case of testing the efficiency of a filter, the difficulty is augmented by the fact that the raw water does not contain, in point of numbers, the same species as does the effluent. On the other hand, prolonging the final count to the third or fourth day endangers the integrity of the gelatin plate, which often becomes liquefied at the end of the second day, unless kept at a temperature lower than 20° C., when the error, occasioned by a still lower temperature, is introduced.

The investigations of others, as well as my own, demonstrate conclusively that Nährstoff Heyden agar permits the development of the maximum number of bacteria, very likely all the bacteria found in a given quantity of water. This medium, according to Hesse and Niedner, who were the first to suggest it (*Zeitschr. f. Hyg.*, Vol. XXIX, p. 454) is prepared as follows:

	Per cent.
Agar-agar	1.25
Nährstoff Heyden	0.75
Distilled water	98.00

The Nährstoff Heyden, which is an albumose, is dissolved in water, mixed with the agar and the whole boiled until the agar is completely dissolved. It may then be filtered through absorbent cotton. The medium requires no adjustment of reaction, nor any other manipulations which, in the case of other media, interfere with the uniform composition of the finished product. Nährstoff Heyden

agar is of uniform composition, and offers the additional advantage that the colonies developing on it never spread nor grow so large as to obscure their smaller neighbors. The plates are usually counted on the ninth or tenth day, although the count may be made on the fifth or sixth day without any great error being introduced. The colonies developing on this medium are, as a rule, not characteristic, but chromogenesis is brought out remarkably well. A plate containing a number of chromogenic species looks like a field bedecked with early spring flowers. It is quite likely that this medium may prove of great use in the grouping of bacterial species according to chromogenesis.

But even if in Nährstoff Heyden agar we possess a medium which will show all the bacteria found in a given sample of water, we are still unable to pass definite judgment on its hygienic quality. After all, the number of bacteria in water indicates the presence of bacterial food, or organic matter, but does not reveal to us the nature of that organic food, whether of vegetable or animal origin. Therefore, the same objection that is raised against the chemical analysis of water pertains with almost equal force to the mere counting of the number of bacteria. To remedy this defect, bacteriologists introduced the presence or absence of B. coli communis, a normal resident of the intestinal tract of man and animals, as the criterion for the presence or absence of fecal pollution. The presence of the B. coli communis indicates the presence of feces, and the contamination with the latter makes it possible for the typhoid bacilli to be present. Consequently, the investigation of water supposed to have been the cause of a typhoid epidemic rests on the presence of the colon bacillus as the indirect but certain evidence. However, the mere presence of the colon bacillus, which is so widely spread in nature, is no certain indication of fecal pollution, unless the number of B. coli is large. Unfortunately, the methods for the enumeration of this microorganism are either too complicated for routine work or inaccurate; and, besides, bacteriologists are not quite agreed as to what constitutes a genuine B. coli communis, there being a number of species not found in feces which closely resemble it.

It would seem from the foregoing considerations that we possess no certain means of detecting dangerous pollution in cases in which a mere sanitary inspection does not make the source of the pollution evident (proximity of privy, discharge of sewage into the stream, etc.).

Fortunately, however, this is not the case. While it is true that no single factor establishes definitely the character of the water under suspicion, a combination of factors with their proper grouping and interpretation is capable of forging a chain of evidence, placing the verdict "beyond a reasonable doubt." The procedure, which will yield satisfactory results, is as follows:

The water is subjected to a chemical analysis, and an adequate portion, 1 c.c. or a fraction of a cubic centimetre, plated in gelatin, Nährstoff Heyden agar, litmus lactose agar, carbolic acid lactose agar and neutral red lactose bouillon.[1] The carbolic acid lactose agar is made by the addition to 5 c.c. of the medium of 0·05 — 0·1 c.c. of Parietti's solution (hydrochloric acid 4 c.c., 5 per cent. carbolic acid solution 100 c.c.). The neutral red lactose bouillon is made by adding 10 c.c. of a 1 per cent. solution of neutral red to 1 litre of lactose bouillon (1 per cent.). The gelatin and Nährstoff Heyden plates are kept at 20° C., and the others at 37° C. The gelatin plates are counted at the end of two days, the Nährstoff Heyden agar plate at the end of nine days, the litmus lactose agar plate at the end of twenty-four hours and the carbolic acid lactose agar plate at the end of forty-eight hours.

Interpretation of Results.—By using these several media we aim to demonstrate: (1) The presence of organic pollution by the combined chemical analysis and bacterial count, the count on gelatin serving as a comparate with the counts obtained by other observers who have used gelatin, while the Nährstoff Heyden agar shows the total number of bacteria.

(2) The presence and number of bacteria which develop at 37° C. and the presence and number of red colonies which may be either B. coli communis, Houston's streptococcus or some other sewage organism producing acid. This information is furnished by the litmus lactose agar plate.

(3) The presence and number of bacteria which resist the addition of carbolic acid, as B. coli communis or some other equally resistant microorganism which could not be an ordinary water saprophyte. This is indicated by the carbolic acid lactose agar.

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[1] The neutral red lactose bouillon was suggested by Dr. Stokes, of the Baltimore City Board of Health, at the meeting of the American Public Health Association, at Washington, D. C., 1903.

(4) The absence or possible presence of B. coli communis as indicated by the production or non-production of gas and characteristic reaction with the neutral red dye.

Given a water which shows on chemical analysis organic pollution and which shows a large number of bacteria on gelatin and a considerable number of bacteria on the litmus lactose agar and Parietti's solution lactose agar plates together with red colonies on the former and production of gas plus characteristic reaction with the neutral red in the neutral-red lactose bouillon, such a water may be pronounced polluted with sewage, beyond a reasonable doubt.

The practical application of this method is illustrated in the following instance.

Water from the race carrying Brandywine water was examined with the following results (in 1 c.c.):

No. of bacteria on gelatin, second day count	1,000
" " " " Nährstoff agar, tenth day count	9,000
" " " " litmus lactose agar, twenty-four hours . . .	57
" " red colonies (proved to be B. coli)	8

Neutral red lactose bouillon (1 c.c. of water), typical reaction.

At the same time the water from the Cool Spring Reservoir, containing the same water, was examined and showed (in 1 c.c.):

No. of bacteria on gelatin, second day count	3,400
" " " " Nährstoff agar, tenth day count	75,000
" " " " litmus lactose agar, twenty-four hours . . .	26
" " " " red colonies	1

Neutral red lactose bouillon (1 c.c. of water) showed production of gas without characteristic change of color.

Subsequent study of the single red colony showed that it belonged to the proteus group.

At another time the race-water showed (in 1 c.c.):

No. of bacteria on gelatin	13,000
" " " " lactose litmus agar	97
" " red colonies (proved to be B. coli)	33
" " bacteria on carbolized lactose agar	46

Neutral-red lactose bouillon, typical reaction.

The water from the reservoir showed (in 1 c.c.):

No. of bacteria on gelatin	16,350
" " " " lactose litmus agar	37
" " red colonies (proved to be B. coli)	7
" " bacteria on carbolized lactose agar	37

Neutral-red lactose bouillon, typical reaction.

The Brandywine water is an extremely polluted stream, receiving the sewage from Coatesville and other places. The water in the reservoir receives but little sedimentation and is drawn near the bottom. We would expect, then, that the water from the reservoir would contain more saprophytic bacteria, while the race-water would contain more sewage organisms. This is admirably demonstrated by the above examinations. Yet, were we to depend on the bacterial count on gelatin alone, the reservoir-water would appear many times worse than the race-water. It is thus seen that by the proper combination of laboratory methods a definite and accurate conclusion may be reached, and it is also evident that in the examination of water reliance on any single method will lead to grave errors.

SOME REFINED METHODS IN WATER PURIFICATION.

By William G. Toplis.

Two years ago it was my privilege to bring to the attention of this body some observations on the hygienic purification of water. Since then, several advances in technique have been achieved that serve to give more accurate data with greater economy in time.

Bacteriological investigation directed to water work has, in the main, a different end from that which is sought, ordinarily, when applied to pathological determinations. The latter effort seeks almost wholly to isolate and identify organisms, where with water the principal study is to determine the number of individual organisms in a definite volume of water, regardless of their kind or character. The assumption being that an impure water will favor the development of a greater number of organisms than a water with little contamination, since organic impurities constitute the food supply for bacterial growth. That this is a fact can readily be demonstrated by a comparative count, on equal quantities of sewage and any potable water. Therefore, in this line of investigation the determination of numbers becomes the principal work, and much energy has been directed to perfecting methods and media calculated to develop the greatest numbers of organisms contained in the water under examination. But while this is the principal effort in the sense of having more time devoted to its study, it does not monopolize the whole importance. It is necessary that a frequent search should be made for a certain organism of the commensal

species, not in the water applied to the filter, but in the effluent. The presence or absence of the organisms here, being a certain indicator of the efficiency of the filter.

The organism sought is known as the Bacillus coli communis, invariably found in sewage. This organism has many features in common with the Bacillus typhosa, and it is almost identical with several organisms found naturally in grain. It is desirable to be possessed of a speedy certain means of identifying the colon bacillus. Several plans have been used, based upon its peculiarities. Among its cultural characteristics is this property, when grown in neutral milk, containing enough blue tr. litmus to decidedly color the milk, the blue color becomes red and a firm coagulum occurs in the test-tube, after eighteen to twenty-four hours' cultivation in the incubator. This red color is due to a change in the reaction of the milk, caused by the transition of the sugar of milk to lactic acid through the agency of the colon bacillus. Advantage is taken of this feature. Plates are made of agar-agar, containing in addition to beef bouillon, sugar of milk, and strongly colored with blue litmus. The plates are prepared by fusing a tube of the media, and when cooled to blood heat, 1 c.c. of the filtered water is added, gently but thoroughly shaken together and poured into the plate. After it is set hard it is placed in the incubator and cultivated at $37\frac{1}{2}°$ C. for eighteen to twenty-four hours, when any colon bacilli developed will be made manifest by red colonies on the plate with a considerable red area surrounding them.

Another means of the identification of the colon bacillus is found in its property of causing fermentation when cultivated in a fluid medium containing 1 or 2 per cent. of a fermentable carbohydrate, such as grape sugar. The products of fermentation are conserved and subjected to analysis. The operation is facilitated and best carried out in a special device known as the Smith fermentation tube, devised by Theobald Smith.

An experiment conducted under these conditions yields a gaseous product of from 30 to 50 per cent. of the volume of the liquid used. On examination of this gas it is almost uniformly found to contain 1 part CO_2 and 2 parts of an inflammable gas akin to hydrogen. The two features briefly described were formerly the principal reliance for the identification of the colon bacillus, but it has been so frequently demonstrated that other organisms duplicated these phe-

nomena that further light was diligently sought for more positive means of identification of this germ, and a decided advance has been made in a modification of the Smith tube reaction described by Irons and others.

It has been found that when neutral aniline red is added to lactose bouillon medium in the Smith tube and a culture of the colon bacillus added, after twenty-four hours' cultivation at 37½° C., a characteristic color reaction is caused by the growth of the organism. The liquid in the stem of the tube assumes a decidedly canary color with fluorescence, while that portion of the medium remaining in the tube retains its original bright red color. If, then, all of the results appear, namely, the volume of gas, the proper percentages of it, the acidity and the typical yellow-red contrast reaction, then the organism may be considered Bacillus coli communis. This method can be carried out in twenty-four hours, and the colon bacillus identified with reasonable certainty; whereas the same result with isolation in pure culture would take from five to seven days. The culture to carry out this experiment may be selected from one of the red colonies grown on the litmus lactose agar plates previously described.

The science of bacteriology is so new and its application to water filtration on a large scale so recent that it is still largely in the experimental stage, and it is quite natural that questions should be continually presenting themselves for solution in every branch of the work. One such problem is of interest, and it involves my personal experience. It concerns the preservation of the plates from premature destruction by growths c certain liquefying organisms, too ,requently found in river water. As previously stated, no pains have been spared in devising media calculated to coax into active growth all, or as many as possible, of the organisms contained in the water under examination. Wide experience has shown that nutrient gelatin medium fills most requirements better than any other, but it falls down in one respect, at least. There is always present a class of germs in river water, called liquefying organisms. During their life process, they excrete a principle known as an enzyme. This substance, in many cases, is exceedingly active, so great at times as to digest and completely liquefy the entire contents of a plate before its time for incubation had expired. It became necessary to prevent the very frequent appearance of the word "lost" in the report, and, after some experimenting, the problem

unwound itself in this fashion: The plates are of gelatin; gelatin is the principle in hides that is acted upon during the process of tanning to make leather. Leather is not acted upon by enzymes, or, at most, but sparingly. Then, why not tan the plate at the point of attack? This was attempted, and a favorable result followed the use of a strong solution of chrome alum, producing a sort of chrome tannage. The procedure was simple and rapid, and consisted in removing the fluid portion from the gelatin with a pipette and replacing it with the chrome alum solution. The effect was instantaneous. The action of the enzyme was arrested, and, in addition, the reduced chromium made a green area around the colony just as far as the tanning process had penetrated, and thus served as a true indicator of the amount of the plate destroyed. At the same time, being transparent, it permitted the counting of any colonies previously developed within its zone of encroachment.

Enzymes seem to be more or less misunderstood; at least there are statements from authoritative sources concerning them that do not agree entirely. For example, on page 650, Sadtler and Trimble's Pharmaceutical and Medical Chemistry, will be found the statement that the activity of all enzymes is destroyed by boiling with water, and not destroyed by antiseptics. From other sources we have been taught that antiseptics do destroy enzymes. The light of recent investigation inclines to the belief that these horizontal statements cannot be wholly sustained.

Drs. Abbott and Gildersleeve, University of Pennsylvania, have definitely shown that proteolytic ferments produced during the growth of such bacteria as Bacillus pyocyaneus, or Bacillus subtilis, etc., are not destroyed by boiling water and are not prevented from exercising their digestive function by antiseptics—at least, by such an antiseptic as carbolic acid. They found that these enzymes resisted the temperature of boiling water when exposed to it from fifteen to thirty minutes, and afterwards attacked and completely digested a medium consisting of

Gelatin	8·	c.c.
Phenol	·25	"
Water	100·	"

and did this with but slightly diminished vigor.

The science of water purification is a many-sided one, and each side has its peculiar difficulties. This seems especially true of the

Philadelphia project, and from an engineering point of view, that which has given the heads of departments in this city the most concern is perhaps turbidity. The wide limitations and the constantly varying amounts of suspended matter carried by, particularly, the Schuylkill River, served to make a very complicated problem. There is no great difficulty in filtering water carrying suspended matter up to 40 parts per million, but above that figure the scrapings become inconveniently frequent, and the effort has been to prepare the water by sedimentation and other means before passing it to the filters.

At times of freshet the Schuylkill River carries every kind of substance from coal dust to microscopic clay particles, the amount running well up into the hundreds of parts per million, and here is where the great problem lay to supply water of uniformly low suspended matter to the filters. Sedimentation alone, such as was possible, was inadequate, and to build for this purpose not economical. But a chain is no stronger than its weakest link. Those freshets were a stubborn fact, and must be met. Yet how? The answer most hopeful was sedimentation with preliminary filtration. Then came the struggle for a proper preliminary filter. Its great office to remove mud and do it regularly, whether the suspended matter be 500 parts or 50 parts per million,—that was a task to stagger the most optimistic. Still they have gone quite a long way on the road toward its realization. At the lower Roxborough filter plant there is in operation a preliminary filter doing very satisfactory work in a practical way, and at the testing station there has been one of the same type at work for a long time, from which experience was gained as to its durability and efficiency; it has given great promise of good and permanency.

It presents some novel features. The walls of the container are of concrete construction, and it is divided into about ten elements; these are controlled separately. That enables the cleaning of each without interfering with the others. The filtering material consists of several sizes of broken slag; the larger at the bottom and the smaller sizes toward the top. On the surface of the slag is placed a layer of sponge clippings 1 foot in thickness. This is compressed to about 6 inches and held down by a lattice of woodwork over all. This sponge or elastic layer, as it is called, really constitutes the strainer, while the slag divides the water into innumerable

small streams before it reaches the sponge layer, because the water is entered at the bottom and passes upward through the various layers. This device filters water at the rate of 45,000,000 gallons per acre per day, of such a quality that it enables the hygienic filters to deliver clean and wholesome water at the rate of 6,000,000 gallons per acre per twenty-four hours—exactly doubling the capacity of these filters. The commonly accepted rate consistent with good work is not over 3,000,000 gallons per acre in twenty-four hours. As a measure of economy the device is well worth its cost. The cleaning of the sponge layer is accomplished by the aid of machinery, and the outfit bears a strong resemblance to a well-equipped laundry establishment.

At each washing there is some loss of sponge material, but it is not serious. The cost of the sponge clippings is about 5 cents per pound.

To the drug-store mind sponges would not seem to be a desirable substance to apply to this purpose, basing an opinion on experience gained with the drug-store sponge in active service, but as the sponges in the filter are constantly submerged, they do not seem to be subject to the same deterioration.

THE TECHNICAL ANALYSIS OF WATER.

By W. E. Ridenour.

The manufacturer of special chemicals requires the analysis of a water to be stated in grains per U. S. gallon and that two analyses of the same water made at the same time shall not vary more than $\frac{1}{10}$ grain on each constituent.

As upon the chemist's report he determines the chemicals to be used and also the quantity per 1,000 gallons or per 1,000 cubic feet.

The different bases and acids found in solution in the water must also be combined according to chemical affinities, as the elements themselves have no meaning in the business mind: *i. e.*, the chlorine, sulphuric anhydride, carbon dioxide, lime, magnesia, soda, etc., must be combined. That is, the elements found in solution must be stated as they exist in combination in the water.

The scheme of water analysis used in the laboratory of the Geo. W. Lord Company is as follows:

Total Solids.—100 c.c. of the filtered sample of water are evaporated to dryness in a platinum dish on a water bath, and the residue dried at 100 c.c. in an air-bath to a constant weight.

Milligrammes of residue multiplied by ·583 equals grains per United States gallon. (U. S. gallon contains 58329·6 grains.) If this residue is taken up in a small quantity of water and tested with phenol-phthalein, it will often give an alkaline reaction when no sodium carbonate is present. This is due to a slight decomposition of the magnesium carbonate into magnesia, while drying in the air-bath.

A sample of Lake Michigan water shows this reaction:

	Grains per U. S. Gallon.
Sodium chloride	·578
Sodium sulphate	·709
Calcium carbonate	4·316
Magnesium carbonate	1·985
Total solids	8·162
Free carbonic acid	7·761

Silica.—The total solid's residue is taken up in dilute hydrochloric acid, evaporated to dryness, and taken up again in dilute hydrochloric acid. The liquid is filtered, the insoluble residue washed, dried, ignited and weighed, which is the silica.

Milligrammes of residue multiplied by ·583 equals grains per United States gallon. Nitric acid should not be used to dissolve the total solid's residue, as in the presence of sodium chloride there is an action upon the platinum dish, due to the formation of free chlorine.

Iron Oxide and Alumina.—200 c.c. of the filtered sample of water are acidified with hydrochloric acid, a few drops of nitric acid added and boiled to remove all carbonic acid. The liquid is allowed to cool, ammonium chloride added and then ammonia to alkaline reaction; allow to stand for ten minutes, then filter. The precipitate washed, dried, ignited and weighed, is the iron oxide and alumina.

Milligrammes of residue multiplied by ·2916 equals grains per United States gallon.

Calcium Oxide.—The filtrate from the iron oxide and alumina is treated with ammonium oxalate, heated and allowed to stand over night. The liquid is then filtered, the precipitate washed and dissolved in warm dilute sulphuric acid, which is then titrated with standard decinormal permanganate of potash solution. The number

of cubic centimetres required multiplied by ·8162 (500 × ·583 × ·0028) equals grains of calcium oxide per United States gallon.

Magnesia.—To the filtrate from the calcium oxalate add ammonia and solution of sodium phosphate, allow to stand over night. The liquid is then filtered, the precipitate washed with ammonia water, dried, ignited and weighed, which is magnesium pyrophosphate.

Milligrammes of residue multiplied by ·2916 equals grains per United States gallon.

The Sulphates.—200 c.c. of the filtered sample of water are acidified with hydrochloric acid and barium chloride added until it ceases to give a precipitate. Allow to stand over night. The liquid is then filtered, the precipitate washed, ignited and weighed, which is barium sulphate.

Milligrammes of residue multiplied by ·2916 equals grains per United States gallon.

Sodium Chloride.—Titrate 100 c.c. of the filtered sample of water with standard silver nitrate solution, using potassium chromate as indicator. The number of cubic centimetres required multiplied by ·68 (1 c.c. $AgNO_3$ equals ·0011674 × 1000 × ·583) equals grains of sodium chloride per United States gallon.

Calcium Carbonate, Magnesium Carbonate and Sodium Carbonate Combined.—Titrate 200 c.c. of the filtered sample of water with standard decinormal sulphuric acid, using methyl orange as indicator. The number of cubic centimetres required multiplied by 1·4575 (500 × ·583 × ·005) equals combined calcium carbonate, magnesium carbonate and sodium carbonate expressed in grains of calcium carbonate per United States gallon.

Free Carbonic Acid.—100 c.c. of the sample of water are taken, to which is added 3 c.c. of a solution of barium chloride, 2 c.c. of a saturated solution of ammonium chloride, and 95 c.c. of lime-water, the strength of which has been previously ascertained. This is allowed to stand over night in a flask, the 100 c.c. is filtered, titrated with decinormal hydrochloric acid. The number of cubic centimetres so found must be deducted from the quantity required for the lime-water. The remainder multiplied by 2·565 (2000 × ·583 × ·0022) equals grains of free carbonic acid per United States gallon.

The Combination of the Acids and Bases.—Different chemists have different schemes of uniting the bases and acids, which should not be. The most rational method would be to state the acids and

bases separately, but this method would not be accepted by the manufacturer.

The statement of results of an analysis of the same water as interpreted by different chemists is often so different that it reflects distrust upon the profession. When if the analyses were resolved into their acids and bases, they would be found to agree.

Fresenius states that "a certain latitude is here allowed to the analyst's discretion."

As a general rule I state the magnesium as magnesium carbonate as far as possible, this combination has been proven to exist in preference to magnesium sulphate by the following series of experiments:

Two waters were mixed in the proportion of 10 parts of artesian and spring water to 1 part of city water and passed through a heater and a purifier. Samples were collected and examined at the different stages and also a sample of sediment from the purifier.

	City Water.	Springs and Artesian Wells.	After going through heater.	After going through purifier.
Organic and volatile undetermined	2·734	3·797	3·557	1 160
NaCl	6·12	1·836	·782	·952
Na_2So_4	—	2·032	—	—
$CaCo_3$	1·398	1·355	·795	.649
$CaSo_4$	3·403	7·068	3 233	3 573
$Mg.Co_3$	1·764	1·985	1·544	·662
Solids	9·911	18·073	9·911	6·996
Free Co_2	9·055	4 139	5·174	2·587
$CaCo_3$ by titration	3·498	3·718	2·633	1·521

Grains per United States gallon.

SEDIMENT FROM PURIFIER.

	Per Cent.
Organic and volatile (undetermined)	15·1
$CaCO_3$	12·6
$CaSO_4$	1·7
MgO	15·5
Fe_2O_3	19·6
Al_2O_3	4·6
Oil	3·0
Silt	27·9

If the magnesium existed as a sulphate in the water the deposit of magnesia could not have formed in the purifier, as magnesium sulphate is a stable compound under the influence of heat.

The remainder of the calcium carbonate determined by titration is stated as calcium carbonate and deducted from the amount of calcium oxide found. The remainder of the calcium oxide is stated as calcium sulphate, and deducted from the barium sulphate found, and if any barium sulphate remains, it is stated as sodium sulphate. Each water requires individual study, and if a sample of sediment formed by the water is also examined, it will decide how a certain base and acid exist in the water.

HERBERT SPENCER AND THE METRIC SYSTEM.

By Florence Yaple.

The question of the adoption and use of the metric system of weights and measures in the United States being the subject of so much debate at the present time, it seems fitting that the position of the late Herbert Spencer with regard to this system should be made more generally known, more especially as his opposition to the general adoption of this system was a life-long one, and also because he may be said to have occupied a position such as enabled him to correlate the views of men of science and men of business.

Without considering the origin and history of the metric system, it may be said that in view of the strong national prejudices, which exist in many countries, as well as other impeding influences, it has made comparatively rapid progress, particularly for scientific purposes. The question arises, is this wholly due to the intrinsic merits of the metric system itself, or is it due in part to the need for a system of weights and measures which is international or universal in its application, as indeed the metric system was intended to be? Or, going a little further, may not a better system than the metric system be found, and may not the universal adoption of the metric system prevent finally the adoption of this better system? This was the question which concerned Spencer. He frankly admitted the advantages of a decimal system to the man of science, but thought it was "ill adapted for industrial and trading purposes."

While perhaps it may seem like taking a step backward to give even so much sanction to Spencer's views as to publish them, still

the question remains whether a better system than the metric system could have been devised, and whether we are justified in abandoning our entire system of weights and measures in favor of a decimal system. The time has probably gone by for the introduction of a better system, in view of the general use of the metric system for scientific purposes (if such were possible), but inasmuch as our old system of weights and measures is still adhered to by the vast majority of trades people, a full and free discussion of the subject is desirable.

In view of the efforts being made in England to obtain governmental sanction of the use of the metric system, and being strongly opposed to its adoption, Herbert Spencer, in 1896, communicated four letters to *The Times* (London) setting forth his objections to the system. These letters were immediately afterward embodied in a pamphlet and distributed to all of the members of the House of Commons, a few of the members of the House of Lords, and also to the members of our own Congress. They have since been made more accessible as well as more permanent by being incorporated in Spencer's book, entitled "Various Fragments."

After taking up the derivation of the metric system, Spencer then goes on "to show that its fundamental principle is essentially imperfect and that its faults are great and incurable."

One of the first of the arguments used against the decimal system by Spencer is the fact that although its adoption in France "has been in the main compulsory," there is evidence to show "that the old customs have survived where survival was possible." Not only so, but in the United States, one of the countries of its partial adoption, and on the English Stock Exchange as well, the decimal divisions of the dollar are ignored, "and the division into parts by halving, re-halving, and again halving is adopted."

Arguments are then taken up to show how the order of nature has established certain measures and divisions for us; such as, for instance, the division of the circle into 360 degrees, this being "the outcome of the Chaldean division of the heavens to fit their calendar;" of the year into twelve months, and also into four seasons or quarters, for astronomical reasons; of the compass into thirty-two points, depending upon the "natural relations of the cardinal points."

The practical need for divisions of quarters and thirds in every-day life is also discussed and their inconsistency with a decimal system pointed out.

Having shown that a "mixed system would in large part remain," and that it is impossible to avoid certain incongruities which necessarily result from the use of a decimal system, the author proceeds as follows: "We agree in condemning the existing arrangements under which our scheme of numeration and our modes of calculation based on it, proceed in one way, while our various measures of length, area, capacity, weight, value, proceed in other ways. Doubtless, the two methods of procedure should be unified; but how? You assume that, as a matter of course, the measure system should be made to agree with the numeration system; but it may be contended that, conversely, the numeration system should be made to agree with the measure system—with the dominant measure system, I mean." This "dominant measure system" is, according to Spencer, the duodecimal system. It is shown that it is quite as easy to form a numerical system based upon twelve as it was originally to build up a system having ten as a basis. It is claimed also that "It needs only a small alteration in our method of numbering to make calculation by groups of twelve exactly similar to calculation by groups of ten; yielding just the same facilities as those now supposed to belong only to decimals." But perhaps the strongest of the claims for a duodecimal system is the need for easy division into aliquot parts, twelve being divisible into halves, quarters, thirds and sixths, while the divisibility of ten is of the smallest. That such a claim is not without foundation is evident if we look into the history of weights and measures. While "numeration by tens and multiples of tens has prevailed among civilized races from early times," they have departed from this system in their tables of weights, measures and values, the tendency being toward "systems of easily divisible quantities."

That Spencer was cognizant of the peculiar merits and aims of the metric system cannot be denied, nor, on the other hand, was he unmindful of the difficulties which would attend the introduction of a new system of numeration and measure like that of the duodecimal.

He objected to the metric system "on the ground that it is inconvenient for various purposes of daily life, and that the conveniences it achieves may be achieved without entailing any inconveniences."

Lest Spencer's position should not be rightly interpreted from this necessarily condensed treatment of his article, the following is quoted in extenuation:

"Evidently moved by the desire for human welfare at large, scientific men have been of late years urging that the metric system should be made universal, in the belief that immense advantages, like those which they themselves find, will be found by all who are engaged in trade. Here comes in the error. They have identified two quite different requirements. For what purpose does the man of science use the metric system? For processes of measurement. For what purpose is the trader to use it? For processes of measurement, *plus* processes of exchange. This additional element alters the problem essentially. It matters not to a chemist whether the volumes he specifies in cubic centimetres, or the weights he gives in grammes are, or are not, easily divisible with exactness. Whether the quanties of liquids or gases which the physicist states in litres can or can not be readily divided into aliquot parts is indifferent. And to the morphologist or microscopist, who writes down dimensions in subdivisions of the metre, the easy divisibility of the lengths he states, is utterly irrelevant. But it is far otherwise with the man who all day long has to portion out commodities to customers and receive money in return. To satisfy the various wants of those multitudes whose purchases are in small quantities, he needs measures that fall into easy divisions, and coinage which facilitates calculation and the giving of change. Force him to do his business in tenths, and he will inevitably be impeded."

Finally, it may be said that Spencer was well aware of the advantage to be derived from the application of the decimal method of calculation to quantities and values; that he was in favor of a uniform system of weights and measures, but held that this was not possible with the metric system, believing that it would necessarily be traversed by other systems, and, notwithstanding the difficulties which would oppose the introduction of a duodecimal system, he believed that its merits were such as to warrant the use of our present mixed system until such time as this more perfect system could be adopted.

PROGRESS IN PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE RECENT LITERATURE RELATING TO PHARMACY AND MATERIA MEDICA.

By M. I. Wilbert, Ph.M.,
Apothecary at the German Hospital, Philadelphia.

The necessity of a higher, or a more thorough technical education for the coming generations of pharmacists, is being actively discussed in several European countries, particularly in Germany and in England. In these countries it is generally conceded that if apothecaries or pharmacists are to retain any professional standing, their education must be in keeping with the advances that have been made in the several departments of science more or less closely related to their occupation or profession.

The general trend of this discussion, in England, is well illustrated by several papers recently published in the *Pharmaceutical Journal* (1904, pages 78 and 82).

"University Education for Pharmacists" is the title of the paper contributed by Prof. Robert B. Wild, of Victoria University, Manchester. In this paper the writer recognizes the necessity of a further and, ultimately, a complete, separation of the trade or commercial branches from the professional or scientific portion of the pharmacist's occupation.

One of the reasons for the present depressed condition of pharmacy Mr. Wild finds in the fact that pharmacists, as a class, have not maintained the intellectual superiority over the general public, possessed by them a generation ago. He believes that pharmacists must adapt themselves to the advancing scientific requirements of the present and the future, and unless they are willing to allow the legitimate development of the scientific portion of their profession to be taken up by others, they must appreciate and provide the equivalent of a university training for the pharmacist of the future.

This paper by Professor Wild contains many suggestions that are applicable to the conditions existing at the present time in our own country. Here, as in England, we have come to the parting of the ways, and in the very near future there will be a need for, and also a due appreciation of, the scientifically inclined and properly educated pharmacist who is willing and able to occupy relatively the same

position to the medical profession and to the general public as did the pharmacist of a generation or more ago.

THE METRIC SYSTEM OF WEIGHTS AND MEASURES IN AMERICAN PHARMACY.—An open letter, headed "Alternative Formulas," published on page 88 (February, 1904) of the AMERICAN JOURNAL OF PHARMACY, may possibly represent the ideas of a number of so-called pharmacists, but it certainly cannot represent the opinions of any one that has tried to keep in touch with the progress in chemistry and other sciences allied to pharmacy. In this connection it would be preposterous, indeed, to assert that the average American pharmacist is not as progressive, or as capable of progressing, as is his fellow craftsman of Germany, Italy or even Russia.

The writer of the letter noted above makes one uncontrovertible statement when he says that "the Pharmacopœia must be a book of working formulas, and these as plain, simple and direct as science in her modesty can make them."

If we compare the formulas of the United States Pharmacopœia with those published in the Dispensatories, or even with the formulas for corresponding preparations in the British Pharmacopœia, it will not be dificult to decide as to which of the three should be designated as being plain, simple and direct.

There is, however, much more to be said in favor of retaining the metric system alone in the coming United States Pharmacopœia. The Pharmacopœia is, or should be, intended for pharmacists, and not for drug-sellers or patent-medicine vendors.

To be a pharmacist, one must be conversant with the chemical tests that are available for the quantitative as well as qualitative examination of drugs, chemicals and preparations.

Any one that has ever attempted quantitative chemical analysis, particularly when volumetric processes are involved, will appreciate the advantages of a decimal system of weights and measures.

So far as known, the metric system of weights and measures is the only decimal system available or in use, and this system, in addition, has the advantage of being universally used by chemists and scientific investigators generally.

If these assertions are based on facts, the Pharmacopœial Revision Committee would be making a very serious mistake to deviate, in any way, from the now well-established practice of having a very high-class book, intended only for such as are willing or anxious to do high-class work.

How the better class of English pharmacists feel about the coming revision of their national standard, is evidenced by a paper on "The British Pharmacopœia," by J. W. Turner (*Phar. Jour.*, 1904, page 96). This writer not only recommends that the General Medical Council adopt the metric system only, in the formulas of the Pharmacopœia, but also that the doses be given in metric quantities alone.

THE BUREAU OF STANDARDS of the Department of Commerce and Labor, under date of December 15, 1903, has issued a circular in reference to the *testing of clinical thermometers*, that will no doubt be of interest to such pharmacists as sell or handle these very essential requisites for the sick-room.

The series of tests that have been devised by this bureau will insure satisfactory instruments under all conditions, as no thermometer that is defective or that exceeds the allowable limits of error will be given a certificate by the Bureau. The proposed charges are quite reasonable, and are according to quantity:

(1) In lots up to 8, each	$ 25
(2) Any number between 8 and 12, total fee	2 00
(3) In lots of 1 dozen or over and less than 4½ dozen, per dozen	2 00
(4) Any number between 4½ and 6 dozen, total fee	9 00
(5) In lots of 6 dozen or over, per dozen	1 50

In this connection it may be of interest to give some extracts from a circular letter issued by the bureau, under date of December 1, 1903:

"The functions of the Bureau of Standards are as follows: The custody of the standards; the comparison of the standards used in scientific investigations, engineering, manufacturing, commerce and educational institutions, with the standards adopted or recognized by the Government; the construction, when necessary, of standards, their multiples and subdivisions; the testing and calibration of standard measuring apparatus; the solution of problems which arise in connection with standards; the determination of physical constants and the properties of materials. The Bureau will also furnish such information concerning standards, methods of measurements, physical constants, and the properties of materials as may be at its disposal, and is authorized to exercise its functions for the Government of the United States, for State or municipal governments

within the United States, for scientific societies, educational institutions, firms, corporations or individuals engaged in manufacturing or other pursuits requiring the use of standards or standard measuring instruments.

"For all examinations, calibrations, tests or investigations, except those performed for the Government of the United States or State governments, reasonable fees will be charged."

The Bureau at the present time occupies temporary quarters in the city of Washington. Permanent laboratories are in process of construction, and when completed the Bureau will be enabled to do even more extensive work than is undertaken at the present time. The present schedule of testing includes measures of length, weights, measures of capacity, polariscopic apparatus, hydrometers, thermometers, photometric standards, and a variety of determinations as to the accuracy of electrical instruments.

The Bureau is desirous to co-operate with those interested and to supply them with such information on the subject of weights and measures as may be in its possession.

All communications should be addressed, "Bureau of Standards, Department of Commerce and Labor, Washington, D. C."

Pharmacy in Chicago.—Under the title "Reminiscences of Early Chicago and its Druggists," Mr. Albert E. Ebert is now publishing a very interesting and readable series of articles in the *Western Druggist*, Chicago.

The first instalment of this very valuable contribution to the history of American pharmacy appeared in the December, 1903, number of the *Western Druggist*, and includes, among other interesting material, an outline sketch of the founding of Chicago, and also some reference to the first settlers.

Atomic Weights.—The International Committee on Atomic Weights reports but two, unimportant, changes in the list of atomic weights. Caesium is given as 132·9, to accord with the determinations made by Richards and Archibald, while cerium, according to the measurements by Brauner, is said to have an atomic weight of 140·25. Both of these are the weights as compared to oxygen = 16. A number of the other elements are known to be more or less uncertain as to the accuracy of their atomic weights, but it was not considered advisable to make any radical changes while work was still under way. (*Jour. Am. Chem. Soc.*, 1904, page 1.)

BOTTLES, FROM WHAT ARE THEY FASHIONED? is the title of a paper recently contributed by Mr. E. O. Rowland to the Edinburgh Chemists' Assistants and Apprentices Association. The writer of the paper, after giving an interesting historical account of the origin and development of glass manufacture, gave a detailed account of the various materials and processes employed in the making of glass. The composition of the several kinds of bottle glass was given as follows:

White glass for ordinary moulded bottles, sand, 64; lime, 6; carbonate of sodium, 23; nitrate of sodium, 5.

White flint glass containing lead, sand, 63; lime, 5; carbonate of sodium, 21; nitrate of sodium, 3; red lead, 8.

Ordinary green glass, sand, 63; carbonate of sodium, 26; lime, 11.

Sand, lime and sodium carbonate are the ordinary bases of glass, the sodium nitrate is added as a decolorizing agent or wash.

The blue tint of poison bottles is obtained by the addition of black oxide of cobalt to the molten glass. The green tint of actinic glass is obtained in the same way by adding potassium bichromate, while the amber tint is usually obtained by the addition of manganese dioxide. (*Phar. Jour.*, 1904, page 96.)

ACHROIN.—This is said to be an aromatic liquid having a specific gravity of 1·055, and a boiling point of 218° C.

It is to be given in capsules of 0·25, as an antiseptic in affections of the urinary tract. (*Süd. Deut. Apoth. Zeit.*, 1903, page 904.)

ADULTERATED SPIKE OIL.—E. J. Parry and C. J. Bennett (*Chem. and Drug.*, 1903, page 1011) report that large quantities of adulterated oil of spike are found on the English market. The specific gravity, optical rotation and solubility are within the limits given by most authorities, but careful examination will usually reveal the presence of one or more foreign bodies.

The usual adulterants are oil of turpentine, oil of rosemary and safrol.

ADULTERATED CITRONELLA OIL.—Parry and Bennett (*Chem. and Drug.*, 1903, page 1061) found 20 per cent. of alcohol in a shipment of citronella oil recently imported into England.

This adulterant, the writers think, is a particularly dangerous one when the oil is bought or sold by Schimmel's test.

Schimmel's test for citronella oil: The oil should give a clear solution with 1 or 2 volumes of 80 per cent. alcohol at 20° C., and

should remain clear even when 10 volumes of alcohol of the same strength are added.

DETERMINATION OF THE ADULTERANT IN CITRONELLA OIL.—M. K. Bamber suggests that a mixture of 2 c.c. of pure cocoanut oil, free from acid, and 2 c.c. of oil of citronella be shaken for one minute with 20 c.c. of 83 per cent. alcohol, in a graduated tube. This container is then centrifugated for one-half to one minute. The volume of the remaining undissolved oil, minus 2, the amount of cocoanut oil used, indicates the impurity. To eliminate any possibility of error, a standard oil may be compared with the suspected sample. (*Phar. Jour.*, 1904, page 28, from *Proc. of Chem. Soc.*)

AUSTRIAN TURPENTINE.—Tschirch and Schmidt (*Arch. d. Phar.*, 1903, page 583), report finding 25 per cent. of laricopinic acid. This is an amorphous acid having the formula $C_{22}H_{30}O_3$; 34 per cent. of laricopinonic acid, a crystalline substance having the formula $C_{20}H_{28}O_4$; 35 per cent. of essential oil having specific gravity of 0·872 and boiling between 154 and 164° C; 2 per cent. of indifferent resene and 3 or 4 per cent. of impurities which were not determined.

BISMUTOSE.—This is a colloid bismuth albuminate, having a yellow color, and said to contain 21.7 per cent. of metallic bismuth, about 3·3 per cent. of chlorine and 68 per cent. of albumin, the remainder being water. It is made, under a German patent granted to Kalle & Co., by dissolving 242 grams of crystallized bismuth nitrate in 1·200 c.c. of a concentrated solution of common salt, and then filtering the solution into a solution of 500 grams of pure egg albumen in 5 liters of water. The resulting gelatinous mass is then washed with hot water until free from acid and salt; it is then pressed, dried and reduced to a powder. The dose is from 1·0 to 5·00. (*Chem. and Drug.*, 1904, page 106.)

BISMUTH OXYIODO-AGARICINATE.—This bright grey, amorphous, insoluble powder is an iodo compound of bismuth and agaricinic acid. Like dermatol, it is intended to be used as an astringent antiseptic. It is also recommended as a remedy in the treatment of the gastric and intestinal complaints that complicate tuberculosis. (*Phar. Jour.*, 1903, page 924, from *Phar. Zeit.*)

EUMYDRIN-ATROPINE METHYL NITRATE is produced by the conversion of the tertiary base of atropine into a quaternary base. Eumydrin is a white, odorless, water-soluble powder that may be

used as a mydriatic in place of atropine. In action it is said to be intermediate between homatropin and atropine. (*Phar. Post*, 1903, page 780.)

Exodin.—This is the trade name for a new aperient that is being marketed in Germany. It is said to be an Oxy-anthra quinone derivative. It is a yellow powder, insoluble in water and only slightly soluble in alcohol. The adult dose of exodin is from 1·00 to 1·50 gm. (*Apothek. Zeit.*, 1904, page 16.)

Iboga.—A Congo plant bearing this name has been examined by Landrin and Dybowsky. Iboga is said to possess properties similar to both coca and kola. Its physiological properties are due to an alkaloid, named by the investigators, ibogaine. Ibogaine in a pure state is insoluble in water, but soluble in alcohol, ether, chloroform and benzene. Ibogaine causes local anæsthesia like cocaine, while in its action on the medulla oblongata it resembles kola. (*Phar. Jour.*, 1904, page 107, from *Schweiz. Woch.*)

Iodterpin.—If equal parts of iodine and terpin hydrate are finely powdered, mixed, and then gently heated on a water bath, they readily unite to form a new compound, called by Mas and Grindel iodterpin. Iodterpin is a thick viscid liquid, having a specific gravity of 1·19 at 15° C., and boiling between 165 and 175° C. It is readily soluble in ether, chloroform, benzine and benzol, and has a characteristic odor, somewhat resembling terpin hydrate.

Iodterpin may be used in place of iodine, and has also been suggested as a substitute for iodoform. (*Apothek. Zeit.*, 1904, page 14.)

Musk, Artificial.—The price of this in Germany has dropped from 1900 marks to 125 marks a kilo. This decline is due to the fact that the German patents have expired. The *Pharmaceutische Centralhalle*, in commenting on this marked difference in price, expresses the hope that the now comparatively low price will not be sufficient inducement for the too liberal use of this particular perfume.

Artificial musk should not be confounded with the natural product, as, despite the somewhat striking musk-like odor, it is quite different in composition and in its physiological action. Chemically, it is said to be a trinitrobutyl derivative of toluol, xylene or an allied substance. One of the commercial brands that is said to have an especially fine odor, closely resembling that of musk, is said to be trinitro-iso-butyl-xylene.

Pharmacotherapy of the Essential Oils.—This is the subject-matter of a lengthy essay in the latest *Semi-annual Report of Schimmel & Co.* Much of the original work contained in this essay was done under the personal supervision of the well-known pharmacologist, Professor R. Kobert, of Rostock. The essay is particularly interesting from the fact that the various oils have been arranged in groups or classes according to their physiological action or possible uses in medicine. Thus, the different essential oils are enumerated as odor corrigents, odorous taste corrigents, stomachics, uterine remedies, diuretics, diaphoretics, antihydrotics, antiseptics, leukotactics, antiparasitics, antidotes, dermerethistics, excitants, sedatives and expectorants.

It will readily be seen, from this list, that essential oils may, and do, have a very wide field of usefulness in medical as well as in pharmaceutical practices, and that it is quite probable that further investigations along these lines may even enlarge on the uses of these very interesting and valuable remedial agents.

Ponticin is the name given by Gilson to a new glucoside which he has extracted from two species of rhubarb—*Rheum rhaponticum* and *Rheum undulatum*.

Ponticin occurs as white crystals that gradually become yellow or even rose colored; are insoluble in water, alcohol and most other solvents, but soluble in a mixture of warm acetone and water. On hydrolysis it yields dextrose and a new body which the author terms pontegenin. Ponticin melts at 231° C. and pontegenin at 187° C. (*Chem. and Drug.*, 1904, page 15, from *Rept. de Phar.*)

Rhein from Aloe Emodin.—O. A. Oesterle (*Schweiz. Woch. f. Chem. u. Phar.*, 1903, page 599) reports that he has been able to oxydize a portion of an acetic acid solution of aloe emodin into rhein by means of chromic acid. From the analytical data furnished the product appears to be identical with the rhein obtained from rhubarb.

Rhomnol.—This is the name given by a French firm to a nucleinic acid obtained from the thymus gland of calves. (*Phar. Centralh.*, 1904, page 6.)

Salibromin is a white unctuous powder, insoluble in water and acids, but soluble in alkalies. It contains 44·5 per cent. of salicylic acid and 51·6 per cent. of combined bromine. It is given in doses of 0·50 to 1·50 as an antirheumatic. (*Phar. Centralh.*, 1903, page 480.)

Soluble Adrenalin Powder.—Mansier (*Schweiz. Woch. f. Chem. u. Phar.*, 1904, page 46), gives the following formula for a compound powder of adrenalin that he claims to be readily soluble in water: Adrenalin, 0·05; citric acid, 0·10; boric acid, 4·85; mix. One centigramme of this powder corresponds to 10 drops of a 1/1000 solution.

Subcutine is the name given to the paraphenol sulphonate of anæsthesine, or the paraphenol sulphonate of para amido benzoic ethyl ester. Subcutine occurs in small white needles, melting at 195·6° C., and is soluble in 100 times its weight of water. Subcutine is not decomposed by boiling, so that solutions of it may be sterilized. It is said to be a powerful local anæsthetic and quite devoid of any toxic action. (*Phar. Jour.*, 1904, page 99, from *Muench. Med. Wochenschr.*)

Synthesis of Nicotine.—Pictet and Rotschy have succeeded in producing nicotine synthetically. This has been accomplished by treating nicotyrine in alkaline solution with iodine, thus producing a monoiodnicotyrine; by treating this with tin and hydrochloric acid they are able to produce a dihydronicotyrine, which, when treated with bromine, is converted into a perbromide. The perbromide is then reduced with tin and hydrochloric acid, and is converted into inactive nicotine.

For splitting this inactive nicotine into its optically active components, tartaric acid is used. The physical properties of synthetic nicotine are said to be identical with those of the natural. (*Phar. Centralh.*, 1903, page 756.)

Trigemin is produced by the action of butyl chloral hydrate on pyramidon. It occurs as white needle-like crystals readily soluble in water. Trigemin when given in doses of from 0·50 to 1·20, is said to be particularly effective as a remedy in migraine and facial neuralgia. (*Phar. Centralh.*, 1903, page 680.)

Paraganglin is one of a number of trade names for the active constituent of suprarenal glands. (*Phar. Post*, 1903, page 781.)

Yeast Extract Substitutes for Meat Extracts appear to have found their way into the English market. A. Searl (*Phar. Jour.*, 1903) gives the following ready means of detecting yeast extracts:

Prepare a modified Fehling's solution by dissolving 12·0 gm. of cupric sulphate and 15·0 gm. of neutral sodium tartrate in 120·0 gm. of water; add to this 15·0 gm. of sodium hydrate that has

been dissolved in 150·0 gm. of water. Then dissolve 0·60 gm. of the suspected extract in 45 c.c. of water, add one-half of the alkaline cupric sulphate solution and boil for one or two minutes; genuine meat extract does not produce any precipitation, while yeast extract produces a copious bluish white curdy precipitate.

New Process for Zinc Oxide.—The *Chemist and Druggist* (1904, page 40) credits Sir William Ramsay with devising a process for making zinc oxide direct from ore or tailings by dissolving the zinc in the ores in sulphuric acid, precipitating with ammonia and subjecting the resulting hydrate to intense heat in a muffled furnace.

A SYMPOSIUM ON THE MEANING OF THE TERMS, PHARMACOLOGY, PHARMACOGNOSY, MATERIA MEDICA AND RELATED TERMS.

Owing to the recent developments in the study of pharmacology, and also owing to the confusion which seems to exist in the minds of a good many people in regard to the meaning of this and other terms, applied in the study of drugs and medicines, it occurred to the editor of this Journal that it would be interesting and profitable to have these terms defined according to their modern acceptation and uses; and with this end in view letters have been sent to a number of physicians and professors in these branches, in various parts of the country. The replies follow in the order of the dates on which they were written or received:

Dear Professor Kraemer:

The use of pharmacological terms by writers has been so various and often so absurd that custom may be said to favor anything except unity of employment of terms of this character. The following scheme seems to me as near the original meaning of the terms as can be at this time guessed, and to be the proper use of them from the scientific point of view.

Pharmacology.—The science which treats of drugs in all their properties and possible relations; and includes as subordinate terms *Materia Medica*, *Pharmacy* and *Therapeutics*.

Materia Medica.—The science which treats of the natural and commercial history of drugs, their physical properties and their chemistry.

Pharmacy.—The art which has for its province the preparation of drugs for practical use in medicine.

Therapeutics.—The science and art whose province is the use of medicines for the relief of disease.

Materia Medica has never been divided, so far as I know, into component parts in terminology, but has for a subordinate term, *Pharmacognosy*, which is the science and art of the recognition of drugs.

Therapeutics is divided—

(1) *Pharmacodynamics*, the science which treats of the action of drugs upon living forms, especially upon the animal creation. It is equivalent to the term, *Physiological action of drugs.*

(2) *Practical Therapeutics*, the art of applying the knowledge acquired in Pharmacodynamics to the relief of disease.

Horatio C. Wood.

Philadelphia, January 15, 1904.

Dear Sir:

In reply to your letter of inquiry let me state that I use the word "Pharmacology" to describe what might be called the Laboratory or Experimental Method of Studying the Action of Drugs. I apply the term "Materia Medica" to the list of medicinal materials which are employed for the relief or cure of disease, and the term "Pharmacognosy" to the study of the individual constituents of the Materia Medica, pharmaceutically, botanically and chemically.

Very truly yours, H. A. Hare.

Philadelphia, January 15, 1904.

My dear Dr. Kraemer:

Your desire to bring about a sharper definition of the terms relating to the branches of science dealing with drugs, is most laudable. Its necessity is shown, for instance, by the fact that Webster's Dictionary gives as one of the definitions of pharmacology: The art of preparing medicines. This meaning of the word is now so obsolete that its retention can only lead to ridiculous mistakes. The Century Dictionary gives a much more acceptable definition; but it fails to differentiate between pharmacology, pharmacognosy and materia medica. The etymology of these words, indeed, does not furnish any basis for their differentiation. The development of the

science, however, has made specialization necessary; and the older generic names have been applied to these specialties. This specialization did not always occur along the same lines of cleavage; and the use of the terms has accordingly been rather loose. This confusion was enhanced by the original similarity of meaning, which made it optional to use one term or the other for any of the very different specialties. At present, however, the use of these terms has become fairly definite, at least with specialists, although not with the general public. The time seems at hand when a common agreement to their definitions could and should be reached.

The entire branch of science dealing with drugs may be called pharmacology, materia medica or pharmacognosy. To avoid confusion with the restricted meaning of these words, the adjective "general" may be prefixed. Either pharmacology or materia medica may be preferred, according to which of these subjects, in their restricted sense, is emphasized. Pharmacognosy, in this sense, appears superfluous, and should be abandoned.

The specialization has occurred along the lines of the special objects and methods of the study of the science, and may be divided into four groups, which, together with the terms commonly applied to them, are briefly as follows:

(1) The action of drugs on living structures: *Pharmacology.*

(2) The physical and chemical characters of drugs: *Materia Medica.*

(3) The preparation of drugs for medicinal use: *Pharmacy.*

(4) The application of remedies to the treatment of disease: *Therapeutics.*

These divisions and their further sub-divisions can be conveniently presented, as in the following table:

Pharmacology (General). Synonyms: Materia Medica. (Pharmacognosy).	*Materia Medica.* Synonyms: Pharmacognosy, Pharmacographia: The physical and chemical characters of drugs and their preparations; their constitution, structure, history, derivation, dosage, etc.	Comprises: Crude Organic Drugs. Organic Chemic Principles. Inorganic Chemic Principles. Pharmaceutic Products.	Constitutes: *Organic Materia Medica* (synonym Pharmacognosy). Includes: Gross Anatomy. Histology. Chemic Character.
	Pharmacy: The prep- tion of drugs.		
	Pharmacology (Physiologic). Synonym: Pharmacodynamics. Reaction between drugs and living structures.		
	Therapeutics: The medicinal application of remedial agents.		

This would lead to the following definitions:

I. PHARMACOLOGY: (1) Wider sense (also *General Pharmacology*): *All that scientific knowledge pertaining to drugs.* This term should be preferred to its synonym, materia medica, if the emphasis is put on the action of drugs.

(2) Restricted sense (also *Physiologic Pharmacology*), or *Pharmacodynamics*): *All scientific knowledge pertaining to the reactions between drugs and living structures.* (The science so defined will utilize materia medica and therapeutics, as it does physiology, physics and chemistry; but does not include them.)

II. PHARMACODYNAMICS: A little-used synonym of physiologic pharmacology.

III. MATERIA MEDICA: (1) Wider sense: Synonymous with general pharmacology; being preferred when the emphasis is on the physical and chemical characters of the drugs.

(2) Restricted sense: *All scientific knowledge pertaining to the physical and chemical characters of drugs, their source, preparation and dosage.*

This includes their designation, source, habitat, collection, etc.; gross and microscopic structure; chemical constitution and characters; physical properties (appearance, odor, taste, solubility, specific gravity, etc.); and dosage.

The subject may be sub-divided into the materia medica of crude organic drugs; of organic and inorganic principles; and of pharmaceutic products.

Organic Materia Medica (also *Pharmacognosy*) *treats of the materia medica of crude organic drugs.* It is often convenient to subdivide it into their gross anatomy, histology and chemic properties.

IV. PHARMACOGRAPHIA: A practically obsolete synonym of Materia Medica.

V. PHARMACOGNOSY: (1) In the wider sense, an objectionable synonym of General Materia Medica.

(2) Restricted sense: Synonymous with Organic Materia Medica.

(3) Often further restricted to *the science of identifying drugs.*

VI. PHARMACY: *The science and art of preparing drugs for medicinal use.*

VII. THERAPEUTICS: *The application of drugs and other remedial agents* (such as electricity, etc.) *to the treatment of disease.*

Very sincerely yours, TORALD SOLLMANN.

CLEVELAND, O., January 20, 1904.

Dear Professor Kraemer:

I agree with you thoroughly that there is a decided haziness surrounding the term "pharmacology," although perhaps not as much around the other two words mentioned. I will not refer to any dictionary, but give you my definition or conception of the three terms:

Pharmacology is the science which treats of the physiological effects of drugs upon the several parts of the living organism.

Materia Medica is that branch of medicine which describes drugs, their therapeutic effects and doses.

Pharmacognosy is the science which treats of the history, derivation, physical properties, adulterations and chemical constituents of drugs, and methods of recognizing the same.

Therapeutics is the art of applying drugs in disease.

Very truly yours, A. R. L. Dohme.

Baltimore, Md., January 21, 1904.

My dear Dr. Kraemer:

I am fully aware of the uncertain and confused use of the terms materia medica, pharmacology, pharmacognosy, pharmacography and pharmacodynamics. Custom is just as apt to fix a term as is correct etymology. It is furthermore true that as we advance in the knowledge of a subject we cannot appropriately retain and apply the terms of the past. Without, however, entering into lengthy explanations and discussions I would offer the following:

Materia medica (there is no plausible reason why we should continue to follow the old custom of beginning these two words with capitals), which means medicinal things or substances or agents, from the standpoint of the pharmacist should be applied to that course in the curriculum of pharmaceutical studies treating of substances (animal, vegetable, mineral, imponderables as light, air, electricity, etc.) used in the practice of medicine, giving the major attention to physiological action and the doses of the various preparations.

Pharmacology has a broad, extensive meaning and includes pharmacy or the art of preparing medicinal substances as well as their action and uses. The term cannot well be applied to any one course or one department of a college of pharmacy. It could be applied to pharmacy and pharmacography as distinct from chemistry and

botany. Pharmacognosy is in my estimation synonymous with pharmacology, although many teachers use it in a more restricted sense as applying to a description of drugs, animal and vegetable. Organic materia medica is by some teachers given the same application or meaning as pharmacognosy.

Pharmacography, which simply means a description of drugs, is, in my opinion, especially applicable to that course of instruction treating of the morphology (crude or gross morphology and histology), history, origin, habitat, commerce, constituents, collecting, drying, garbling, curing and powdering of crude drugs; cultivation of drug-yielding plants, etc. This course must of necessity be distinct from pharmacy, chemistry, and materia medica. I have applied the term pharmacodynamics to that course which treats of drug action based on laboratory tests or experiments on animals. Colleges of medicine usually designate such a laboratory course as pharmacology, it seems to me erroneously for reasons given above.

The following tabulation will perhaps aid in making clear the relationship and relative importance of the terms referred to in the above. I would suggest discontinuing the use of the term pharmacognosy entirely, because of the indefinite way in which it is applied.

I. Pharmacology.

(1) Pharmacy (including a course in dispensing).

(2) Pharmacography (vegetable and animal).

(3) Materia medica (general).

(4) Pharmacodynamics (principally toxicology).

II. Chemistry (general and pharmaceutical).

III. Botany (general and pharmaceutical).

It is of course understood that vegetable pharmocography is special botany.

In conclusion I would express the hope that the conference of teaching faculties may take this matter up and decide upon a uniform nomenclature to be used by colleges of pharmacy.

Yours very truly, ALBERT SCHNEIDER.

SAN FRANCISCO, CAL., January 25, 1904.

Dr. Henry Kraemer, Editor AMERICAN JOURNAL OF PHARMACY.

Dear Sir: In reply to your letter of the 15th inst., I would say that there is much confusion in the use of the terms mentioned,

due to the application of words in defiance of their derivation, and regardless of their meaning. This is seen in the employment of the synonymous terms *Pharmacology* and *Pharmacognosy* for two different subjects, and in the extension of the term *Materia Medica* to include matters wholly beyond its proper scope. A comprehensive and correct schema would be about as follows:

Pharmacology or **Pharmacognosy,** the science of medicines, divided into:

(1) MATERIA MEDICA, their description, physical properties, chemistry and dosage.

(2) PHARMACODYNAMICS, or PHARMADYNAMICS, their powers and fate in the body, divided into:

(*a*) *Physiological Action,* in small and full doses.

(*b*) *Toxicology,* in lethal doses, including their antidotes and physiological antagonists.

(3) PHARMACY, the art of their preparation for medicinal use.

(4) THERAPEUTICS, their use in disease.

Of course many subdivisions could be made, but the above would form the main schema, would be consistent and readily understood. Under Materia Medica, a subdivision, *Pharmachemics,* would include solubilities and incompatibility. Therapeutics might be divided into *natural, empirical* and *rational therapeutics,* so as to make the subject systematic in all its ramifications, but these refinements are outside the limits of your question.

Very truly yours,

SAMUEL O. L. POTTER, M.D. (Jeff.),
M.R.C.P., London.

SAN FRANCISCO, CAL., January 25, 1904.

My dear Kraemer:

The following are excerpts from papers which I have already published:

It would seem unnecessary to define in the columns of a medical journal what is meant by pharmacology, but the frequent confusion of this term with pharmacy by those who are not teachers of medicine must serve as a reason for a brief statement of the methods and aims of this branch of medical science.

The vague and often erroneous use of the word pharmacology seen in earlier writings, as in the definition of Nathan Bailey (1736),

"a treatise concerning drugs," or in that of Samuel Johnson (1755), "an equivalent of pharmacy or pharmaceutics," is still frequently met with in our own time. Briefly stated, pharmacology tries to discover and explain all of the more obvious functional, and the less noticeable chemical and physical changes that occur in a living thing that has absorbed a substance capable of producing such changes, and it is also its province to learn the fate of the substance thus incorporated. It is not, therefore, an applied science like therapeutics; it is one of the biological sciences, using that term in its widest sense.

Now what does this revival of an old word mean? One of the most eminent investigators in this field, Professor Schmiedeberg, of Strassburg, has defined pharmacology as "The study of the changes brought about in living organisms by chemically acting substances (with the exception of foods), whether used for therapeutic purposes or not."[1] It is to be noted that these changes induced in the body are not merely such as can be expressed in the terms of an equation, but include those varied molecular processes which lie in that ever-widening borderland between physics and chemistry, where hide the secrets of vital activity.

Like its sister sciences, physiology, physiological chemistry and pathology, it is making great progress along certain physical and chemical lines, which is pioneer work of a necessary kind toward an explanation of vital processes.

Yours faithfully,

JOHN J. ABEL.

BALTIMORE, MD., February 1, 1904.

[*To be continued.*]

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

ELEMENTARY DISPENSING PRACTICE, FOR STUDENTS OF PHARMACY AND MEDICINE. By Joseph Ince, F.C.S., F.L.S., F.R.M.S., Pharmaceutical Chemist, Associate of King's College, London, late Lecturer in Pharmacy to the Pharmaceutical Society of Great Britain, formerly Member of Council and Examiner. Published at the offices of the *The Chemist and Druggist*, 42 Cannon Street, London E. C., 1903. Price, 3*s*. 6*d*., net.

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[1] Schmiedeberg, "Grundriss d. Arzneimittellehre." II. Aufl., s. 1.

This book, as suggested by the title, is composed of a very large number of examples intended for the practical instruction of prospective dispensers of medicines. As indicated by the price, the book is not a very large one, and being published in England, and the contained examples being based on the preparations of the British Pharmacopœia, the book is not particularly well adapted for beginners in pharmacy in this country. For more advanced students, however, or for such pharmacists or teachers of pharmacy as are willing or anxious to learn by having thoughts and ideas suggested to them, this little book will be worth many times the moderate price that is asked for it by the publishers.

Mr. Ince, the author of the book, is well known to the English-speaking pharmacists throughout the world, having been a liberal contributor to pharmaceutical journals for more than half a century. During this long period of time Mr. Ince has naturally profited by his experiences, and has acquired a large and evidently well assorted collection of miscellaneous knowledge bearing on pharmacy in all its branches. That he is well fitted to give an exposition of the art of dispensing is evidenced by every page in the book.

It must be remembered, of course, that many of the contained suggestions are not applicable to practice in this country, and also that many of the ideas and opinions are the expressions of a man that has long since passed the time when he was ready or anxious to take up with what might be termed new ideas or new methods. The book consists of about 150 pages, and is divided into twenty-one, generally short, chapters, and a liberal, well-arranged index.

Among the more interesting or more important chapters we may enumerate those on: Precautions in Dispensing, Simple Solutions, Pilulæ, Emulsiones, Linimenta, Ungenta, Suppositoria, Pulveres, Emplastra, and Definitions.

Pills and emulsions are given the greatest amount of attention; the chapter on pills occupying 30 pages, while 22 pages are devoted to the consideration of emulsions. It will be generally admitted that a thorough familiarity with these two classes of preparations should be, quite properly, considered to be of greatest importance to a prospective dispenser.

Altogether it may be said that the number and variety of examples given, with the accompanying directions and explanations, will contribute materially to make a student familiar with, and also teach

him how to avoid, many of the difficulties that arise in everyday practice, while, as noted before, to the pharmacist or the teacher this book should be an almost inexhaustible fund of ideas and suggestions.

The book throughout bears evidence of the originality and individuality of Mr. Ince, and this fact alone should recommend it to all that have seen or become familiar with any of his interesting, and always sprightly, contributions to pharmaceutical literature.

M. I. WILBERT.

PHARMACEUTICAL MEETING.

The fifth of the Pharmaceutical Meetings of the Philadelphia College of Pharmacy of the present series was held on Tuesday, February 16th, at 3 o'clock. Mr. Mahlon N. Kline, chairman of the Board of Trustees, presided. In opening the meeting Mr. Kline remarked that the papers to be presented would be of great interest to Philadelphians, as upwards of $25,000,000 are being spent to secure a pure water supply for this city.

The first speaker on the programme was W. E. Ridenour, a specialist in the chemical analysis of water, who read a paper on the "Technical Analysis of Water." (See page 121.)

In answer to a question by Mr. E. M. Boring, Mr. Ridenour stated that it required about three days to complete an analysis of water, but that usually four analyses were conducted at the same time; and in reply to Prof. C. B. Lowe he stated that while a quart of water was sufficient for analysis, he preferred to have a gallon submitted.

Mr. Ridenour said in addition that the following is the scheme of analysis, used by the chemist of the Northwestern Railroad, for the separation of the scale-forming constituents from the non-scaling matter:

Five hundred cubic centimetres of water is evaporated to dryness and dried to a constant weight at 100° C. in an air bath. The residue is exhausted with 66 per cent. solution of 96 per cent. alcohol. This gives a residue containing $CaCO_3$, $MgCO_3$, $CaSO_4$, SiO_2, and a solution which contains the soluble salts of calcium, magnesium and sodium.

He had not had time to test this method in comparison with the scheme given in his paper, but said that it was a very useful method

for determining how the magnesium actually exists in the water, as the combination of the different bases and acids to represent their existing forms in solution in the water, is often a very hard question to decide.

Wm. G. Toplis, a well-known expert in the examination of drinking water, read a paper on "Some Refined Methods in Water Purification" (see page 116), which was illustrated with specimens of cultures, which he presented to the College. The paper elicited considerable discussion. In reply to a number of questions by Warren H. Poley, Mr. Toplis stated that there were hardly likely to be any bacteria growing in the service pipes, that the effluent waters from the filters contained as low as six bacteria per cubic centimetre, also that the number varied from fifteen to fifty as against the river water before entering the filter, which contained from 500 to 1,500, or even more organisms per cubic centimetre. Mr. Toplis spoke highly of the competency of the engineer corps connected with the filtering plant in Philadelphia, and thought that ultimately the citizens of Philadelphia would be proud of the finished work.

He also stated in reply to Mr. Poley that the magma formed by the addition of 1½ grains of alum to a gallon of water would remove even as much as 95 per cent. of the bacteria.

Mr. Toplis stated, in answer to a question by Mr. Kline, that the river-bottom sand is preferable to sand from other sources in that the particles of sand are already surrounded by the gelatinous envelope formed by bacteria, which is serviceable in the purification of water and so serves as a naturally prepared material for filtration purposes, thus saving time in the so-called ripening of the filter.

The subject of the origin of outbreaks of typhoid fever was discussed and in the main it was thought to be due to sewage contamination in water and milk. Professor Lowe spoke of an outbreak among the members of one of the fraternities at Yale University some years ago, which was traced to raw oysters which had been gathered in beds exposed to sewage contamination. Professor Kraemer referred to the fact that during the past summer he had an opportunity of visiting a number of the truck gardens in the vicinity of Philadelphia, and that the usual way of enriching the land was by the use of "privy manure," which is not infrequently collected in large pools on the farms. He stated that he thought that this might be a source of disease in certain cases, as the sewage

is brought in direct contact with the vegetables, as lettuce, celery, etc. He also alluded to the fact that it has been proved that certain bacteria even enter into the tissues through the stomata.

The next paper was one on "Methods and Interpretation of Water Analysis," by Dr. A. Robin, bacteriologist to the Water Department of Wilmington, Del. (See page 101.) The paper was illustrated with a number of cultures, one of which, *Bacillus violaceus*, he presented to the college. In the discussion of the paper afterwards Dr. Robin stated that in 1893 a semi-mechanical filter was built in Wilmington, Del., in which the oxidation was carried to an extreme, and in the same year a slow sand filter was established in Lawrence, Kan., where the water was also badly polluted. As proving the superiority of the slow sand filter the death-rate from typhoid in Lawrence has been reduced very considerably, whereas in Wilmington the rate has not diminished appreciably.

Professor Kraemer called attention to the fact that this was the third meeting in recent years at which there had been a discussion on the subject of water analysis. The first paper was by Dr. G. T. Moore, who had studied the subject of water contamination in Boston, and was entitled "Algæ as a Cause of the Contamination of Water" (see this JOURNAL, 1900, page 25); the second was by Mr. Toplis, on the "Filtration of Water" (see this JOURNAL, 1902, p. 67), and he said that on the present occasion we were fortunate in having a symposium on water analysis from a chemical and biological point of view, and moved that a vote of thanks be tendered the several speakers who contributed the papers, which motion was unanimously carried.

M. I. Wilbert, Ph.M., read some extracts from a quarterly review on "Progress in Pharmacy." (See page 129.)

The following provisional programme has been arranged for the next meeting:

"Aromatic Elixir," illustrated with samples, by Prof. Wilbur L. Scoville, Massachusetts College of Pharmacy.

"A Percolator Stand," by Harold Bertram Morgan, P.D.

"A Physician's Experience with Pharmacists," by Dr. Carl Freese, L.S.A.

Notes from Joseph Ince's book on "Elementary Dispensing," by M. I. Wilbert, Ph.M.

"Price Lists of Forty Years Ago," by William McIntyre, Ph.G.

HENRY KRAEMER, *Secretary.*

NOTES AND NEWS.

HEAVY LOSSES BY DRUG FIRMS.—The loss sustained by the drug trade of Baltimore as a result of the recent disastrous fire there, is estimated as not far short of $1,000,000. Various wholesale houses were burned out, and also a large number of retail stores. including the two leading ones in the city. The three leading wholesale firms whose properties were entirely destroyed, were Muth Brothers & Co., the Stanley & Brown Drug Company, and James Bailey & Son. These firms all had a large local patronage, and the loss has been seriously felt by the retail druggists of Baltimore. Fortunately, the large manufacturing firms of Sharp & Dohme, and Gilpin, Langdon & Co., were not reached by the fire, and these firms are able to carry on business as heretofore. The Baltimore branch of Parke, Davis & Co. was destroyed, the loss being $50,000.

THE ST. LOUIS EXPOSITION.—The list of European savants who have accepted invitations to deliver addresses at the International Congress of Arts and Science at the St. Louis Exhibition are the following: In Department 9 (Physics), Professor Dewar, the Royal Institution, London; M. Becquerel, member of the Institute of France. In Department 10 (Chemistry), Professor Moissan, Paris; Professor Fittig, Strassburg; Professor Van t'Hoff, Berlin; Professor Kossel, Heidelberg; Professor Mendelejeff, Technical School, St. Petersburg. In the biological section, the name appears of Professor Bower, of Glasgow, one of the examiners in Scotland to the Pharmaceutical Society.—*The Pharmaceutical Journal.*

THE SCIENTIFIC ATTITUDE IN EVERYDAY LIFE.—Prof. Francis E. Lloyd, of Teachers' College, Columbia University, in an address to the recent graduating class of Northwestern University, described the method of thought used by the scientist, and showed that this method is used by all of us in everyday life; that it is the method which we use as children. When used by the scientist, it comes under careful scrutiny and control. We therefore see the meaning of Huxley's statement that the method of the scientist is refined common sense. All studies may be prosecuted by this method, since it is common to all. Any advantages which one study may offer beyond another must be due to its subject matter

The strict application of the scientific method makes for ideals in life and character, since it enforces upon the mind standards of honesty which are of the highest, and are impersonal. Those who have had the advantage of scientific training, should see clearly that they are under the obligation to carry the ideals thus gained into their everyday lives.

The pharmacist, who stands in a peculiar relation to human life, must have, with the physician, the same impersonal attitude. His scientific training should bring him to recognize this obligation. The oath of Hippocrates, which binds the physician to do no mischief, is binding also upon the pharmacist, who shares the responsibility of the physician.

THE AMERICAN
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APRIL, 1904.

A CHEMICAL STUDY OF THE SEED OF RHUS GLABRA.

By G. B. Frankforter and A. W. Martin.

The Anacardiaceæ or Cashew family contains about 450 species. Most of these occur in the tropical regions. The genus Rhus or sumac represents about the only members of the order occurring in Northern United States. Of the 120 species of Rhus, about 20 are considered as having medicinal or commercial value. An infusion of the leaves, the bark and the pubescence of the seed of several species, is used in both the dyeing and the tanning industries. Sixteen species are mentioned in the United States Dispensatory.

Rhus glabra, the species under discussion, is one of the most common in the Northern States. It has been studied several times. Watson made an examination of the bark of the root, recording the following constituents: gum, resin, caoutchouc, starch, albumin, gallic and tannic acids and coloring matter. (Amer. Jour. of Pharm., **25**, p. 194.) The amount of tannin in the leaves has been found to vary widely. Analyses of the leaves from the Northern States show an average of 16 per cent., while the leaves from the same species growing farther south contain as high as 25 per cent. An examination of the galls of the same species showed nearly 62 per cent. of tannin. (Amer. Jour. of Pharm., **62**, p. 564.)

The seed of the Rhus glabra has been mentioned; but, so far as could be ascertained, only the briefest preliminary examination has been made. Tannin has been recognized in the seed and malic acid in the pubescence. In addition to these constituents, fixed oil, a volatile oil and coloring matter have been mentioned.

Experimental Part.—The seed used in the following experiments was gathered about the 1st of September, after it had become fully matured and the husk had begun to dry. A large amount of seed was gathered and preserved in as near the condition it existed when gathered as possible.

Moisture.—The determination of moisture was made on the whole seed, which was found to be quite different from results obtained from the seed after it was ground. In both cases the husk was included.

Weight of seed, including husk	100 grammes.
Loss, after heating two hours at 105° C. to 110° C. . .	6·862 "
Per cent. of moisture	6.862

Ash.—The unusually high percentage of ash led to a somewhat extended examination as to the cause. The unhusked seed gave an average of 2·65 per cent. of inorganic matter. Upon examining the husk under the microscope, it was found that the pubescence of the husk had collected a large amount of dust. This was subsequently verified by an ash determination of the husk.

Acidity of the Seed.—A preliminary examination showed the presence of several acids. The complex nature of these acids led to a simple determination of the total acidity of the seed by means of sodium hydroxide. The acids were extracted by means of hot water. Two sets of experiments were made—one on the whole or unground seed and the other on the pulverized seed, the object being to locate the acids. It was found that the kernel was almost impervious to boiling water, so that any acid extracted from the whole seed would come largely at least from the husk.

Extract from 5 grammes of unground seed, including husk, required.	0·052 grammes NaOH.
Extract from 5 grammes of ground seed, including husk, required.	0·059 " "

These results were later verified when a satisfactory method of separating the husk from the seed was found. In fact, the husk seemed to contain practically all of the acid.

Extracts from the Whole Seed.—In order to determine the amount of extract material in the whole seed, it was pulverized and extracted with ether, alcohol and water in the order named.

50 grammes of seed gave 11·193 grammes of extract with ether, or	22·36 per cent.

50 grammes of seed gave 3·37 grammes of extract with alcohol, or	6·74 per cent.
50 grammes of seed gave 2·38 grammes of extract with water, or	4·76 "

An examination showed that these extracts were of complex nature. The extract obtained from the ether consisted chiefly of an oil of peculiar properties and a reddish solid substance. This solid substance, on precipitating from ether, appeared as a yellowish crystalline mass and gave tests for tannic acid. The alcoholic extract was a dark amorphous mass with a peculiar astringent and slightly acid taste. There was present a small amount of oily substance. The aqueous solution contained, in addition to the bitter principle, an appreciable quantity of acid.

The results of the above experiments, with other preliminary tests, showed that the husk was of unusual interest, besides having entirely different properties from the seed proper.

The separation of the husk from the seed was a difficult problem and up to the present experiments had not been successfully accomplished. It was found that by passing the whole seed through a carefully-adjusted pulp-mill, the husk could be completely removed from the seed without crushing the latter in the slightest degree. An exact determination gave the following proportion of the seed and husk:

Seed	60·1 per cent.
Husk	39·9 "

The Seed Proper—An examination of the husked seed showed quite different results, as will be seen from the following determinations:

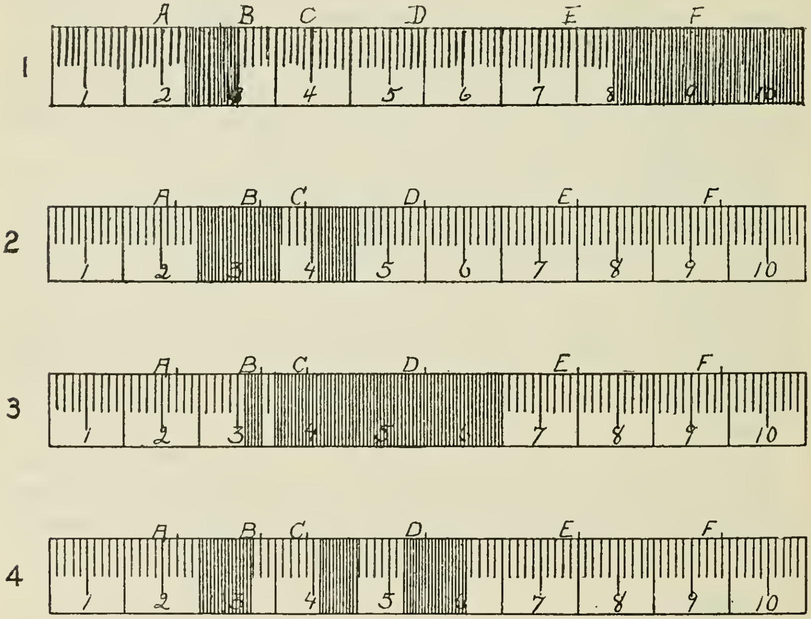
Moisture	4·93 per cent.
Ash	1·98 "

The acidity was reduced to a minimum, 5 grammes of the seed requiring only one-fourth of the amount of sodium hydroxide necessary to neutralize the same weight of unhusked seed.

Rhus Seed Oil.—In the first examination of the seed for oil, the whole or unhusked seed was used. The very complex nature of the oil obtained made it necessary to seek some method of obtaining a simpler substance. An examination of the seed and the husk separately, revealed the fact that the complex nature of the oil obtained from the whole seed came largely from the husk, and that the oil of the seed was a single comparatively pure substance.

This oil was obtained in considerable quantities by extracting the ground seed with ether. Five exact determinations were made giving an average of 9·1 per cent. of oil.

The oil obtained is a light yellow mobile liquid with a peculiar odor and a pleasant taste. At — 18° C. it becomes viscous and at — 24° C. it is a solid. The specific gravity at 20° C. is 0·9203 and at 0°, 0 9312. The oil is soluble in nearly all of the organic solvents, including ether, chloroform, benzene, carbon disulphide and acetone. The index of refraction at 0° is 1·48821 and at 15°, 1·48228. It is optically inactive.



(1) Rhus oil; (2) Wheat oil; (3) Corn oil; (4) Linseed oil.

The absorption spectrum is peculiar. Even with comparatively thin layers, 4 to 6 m.m., the violet rays of the continuous spectrum are entirely cut off and in the red portion about the position of the lithium band there appears a perfectly black band. The above is a simple diagram as compared with linseed, corn and wheat oils.

Drying Properties of Rhus Oil.—Rhus oil is essentially a non-drying oil. In quantities, the loss on exposure to the air is very small, but when a thin film of oil is exposed the increase in weight is such

as would almost place it in the semi-drying group. The following table is a comparison of rhus oil with wheat and linseed oils. The increase in weight is given in parts per hundred, the time extending over a period of thirty days:

Number of days	5	10	15	20	25	30
Rhus oil, gain . . .	0·005	0·027	0·054	0·071	0·104	0·142
Wheat oil " . .	0·037	0·077	0·15	0·24	0·30	0·37
Linseed oil " . .	0·037	0·13	0·28	1·74	4·82	7·55

Saponification Value.—The determination of the saponification value was made by the common method of saponifying a known quantity of the pure oil with standard alcoholic potassium hydroxide, calculations being made in milligrams of hydroxide per gramme of the oil. Three determinations gave the following:

I. 2·0005 grammes of oil required . . 0·39086 gramme of potassium hydroxide
II. 1·8923 " " " " . . 0·26817 " " " "
III. 1·9096 " " " " . . 0·3707 " " " "

	I.	II.	III.
Calculated in milligrams of KOH per gramme of oil . .	195·3	194·9	194·7

These values indicate a non-drying oil, the range of which is from 190 to 200.

Iodine Value.—The iodine value was determined by the Hübl method. The time required for the complete absorption of the iodine was much greater than in the common oil. Three determinations gave the following:

I. 0·1611 gramme of oil absorbed . . . . 0·014155 gramme of iodine
II. ·1668 " " " " . . . . 0·014339 " " "
III. ·1737 " " " " . . . . 0·014848 " " "

	I.	II.	III,
Per cent. of iodine absorbed	87·86	85·96	86·4

Determination of Glycerol.—Glycerol was determined by the well-known method of Benedict-Zsigmondy, which consists in saponifying the oil and oxidizing the glycerol by means of alkaline potassium permanganate to oxalic acid according to the simple reaction,

$$C_3H_8O_3 + 3O_2 = C_2H_2O_4 + CO_2 + 3H_2O.$$

The oxalic acid was then determined as calcium oxalate and the per cent. of glycerol calculated.

I. 2·6859 grammes of oil gave . . . . 0·2493 gramme of glycerol
II. 2·5314 " " " " . . . . 0·2114 " " "

	I.	II.
Calculated for $C_3H_8O_3$	9·28	8·35

Unsaponifiable Matter.—The determination of unsaponifiable matter was made by a method used for the determination of the cholesterols in oil, namely, the complete saponification of the oil, drying and extracting the unsaponifiable matter by means of ether. Two determinations gave an average of ·696 per cent. of substance. By repeating the process on a large scale a considerale quantity of substance was obtained. A chemical study of the substance is in progress. The work done so far would indicate that the substance belongs to the cholesterols, being a monatomic alcohol. From the analyses, it would appear that the molecule is larger than that of the cholesterols, though belonging to the same class.

The Examination of the Husk.—The husk and the pubescence were removed from the seed by the method already mentioned and examined. The material was of a reddish color, the coloring matter being soluble in ether, alcohol and water. It has a slightly acid and a peculiar astringent taste. These solutions gave strong tests for tannic acid. By shaking out the dried aqueous extract with ether, a large amount of impure tannic acid was obtained. This was subsequently purified and examined.

On evaporating the aqueous extract to a thick syrup and allowing to stand several days, a reddish granular mass appeared in the bottom of the dish. This was removed, washed several times with water and recrystallized. The substance then appeared as small white cubical crystals, which were identified as acid calcium malate. They had a melting point of 81° C. The filtrate was found to contain practically all of the tannic acid, but there seemed to be no free malic acid, as reported by Reinsch. (*Zeitschrift f. Chemie*, 1886, p. 221.)

From the aqueous extract, which represented exactly one-quarter of the weight of the husk, the tannic acid and the acid calcium malate were determined. The results were as follows:

Tannic acid	7·32 per cent.
Acid calcium malate	1·35 "

Rhus Husk Oil.—The husk, which had been extracted with water, was dried and extracted with ether. The substance remaining after the evaporation of the ether, appeared as a black oil. At the ordinary temperature, it was a semi-solid. An average of several determinations gave 8·5 per cent. of oil.

An examination of the oil indicated that it was quite different in

many respects from the oil which occurs in the seed. Its specific gravity was taken at 20° C. as a semi-solid and at 35° C. as a liquid. The former was 0.9412 and the latter was 0.933. Like the Rhus seed-oil, it is non-drying, but a single test indicated that it had more of the drying properties than the seed-oil. This may have been due to the fact that more foreign matter existed in this than in the seed-oil. This statement is probable, inasmuch as the iodine values in the two oils are about the same. Three iodine determinations gave the following:

I. ·1816 gramme of husk-oil absorbed	. ·01584 gramme of iodine		
II. ·1560 " " "	. . ·01364 " "		
III. ·1638 " " "	. . ·01422 " "		
	I.	II.	III.
Per cent. of iodine	87·1	87·4	86·7 ; average, 87·2

Two determinations of saponification value gave the following results:

I. 1·5044 grammes of husk-oil required, ·2699 gramme of potassium hydroxide		
II. 1·6205 " " " ·2917 " " "		
	I.	II.
Calculated in milligrammes per gramme of KOH,	179·3	180·1 ; average, 179·7

The chief difference between these two oils is due to unsaponifiable matter, to an easily oxidizable substance and to the fact that the husk oil contains two distinct oils. It was found that by treating with acetone, about 80 per cent. of the oil dissolved, and by evaporating off the acetone was obtained as a light-yellow liquid. The insoluble substance appeared as a black semi-solid. The light-yellow oil was compared with the seed-oil, but was found to differ in various ways. The black oil and the unsaponifiable substance present in it are under examination at the present time.

The Cholesterols.—The cholesterols are among the most mysterious compounds with which the plant and physiological chemist has to deal. Little more can be said of them than the simple fact that they are complex mon-atomic alcohols of aromatic nature, and that they are widely distributed in both the plant and animal world. There is, at the present time, no good reason for their existence, and yet as plant and animal analyses progress, the more widely they appear to be distributed. It was formerly supposed that common cholesterol was almost or entirely of animal origin, and that phytosterol, an isomeric form, was of vegetable. Such an idea is no longer

tenable for cholesterol, as well as its iso- and para-form (*Jour. Am. Chem. Soc.*, 21, p. 766), has been isolated in the vegetable oils.

The complexity of the molecule, the difficulty in obtaining them in quantities and the inactivity toward other substances, are some of the causes of our meagre knowledge of the cholesterols. From examinations of a number of vegetable and animal oils, there seems little doubt but these four or five forms represent only a small portion of the group.

Both of the substances obtained from the above oils, according to analyses, are mon-atomic alcohols, but with a higher molecular weight than cholesterol. The unsaponifiable substance above obtained is at present under examination. The purified substance obtained after repeated crystallizations had a melting point of 63·5° C. to 64° C. Like cholesterol, it does not readily react with other reagents, but enough has been done to indicate that both of these substances, although of a more complex nature, belong to the cholesterol group.

CHEMICAL LABORATORY, UNIVERSITY OF MINNESOTA.

AROMATIC ELIXIR.

By WILBUR L. SCOVILLE.

Ten years ago the interests of pharmacists in elixirs was centred mainly in the question, What is the best flavor for an elixir for general use? Our drug journals offered prizes for elixir formulas, and the formulas offered differed mostly in the character of the flavor.

To-day an orange flavor is generally adopted as, all things considered, the best adapted for a basal elixir. No flavor blends so well with all kinds of medicaments, or covers disagreeable tastes to better advantage. Seldom is there heard a demand for any other fundamental flavor.

As a type of an orange elixir, the aromatic elixir of the Pharmacopœia stands at the head of published formulas. It is a well-blended mixture which contains just enough aromatics to bring up the softer orange. But as compared with some commercial elixirs it lacks power and freshness. Many pharmacists seek to supply this lack by the addition of other aromatic oils in liberal quantity, and thus lose the chief characteristic of the original flavor. These highly aromatic combinations are not wholly satisfactory, since they

often fail to cover well the taste of disagreeable substances. A strongly flavored elixir will not be as generally successful in concealing unpleasant tastes as a milder and softer quality that appears bright and pronounced. What is now desired is an orange elixir that will have the fresh and bright qualities of fresh oranges, with just sufficient aromatics to bring up the flavor without making it spicy.

The first failing in the official formula lies in the unreliability of the orange and lemon oils in common use. That these are very much adulterated is well known, and when to this is added an extreme sensitiveness to air which causes a destruction of the flavor, even in the elixir itself, the difficulty of securing the desired results are the more marked. A pure oil changes much less rapidly and markedly than an impure in the elixir.

The best means of securing an undoubtedly pure oil is to use the fresh fruits. Oranges and lemons can be obtained in all parts of the country at reasonable prices, in their season, and for the pharmacist a tincture of the fresh peel is the best means of obtaining the flavor. This plan is already followed in many pharmacies with much satisfaction. The usual method is to grate off the outer yellow layer of the peel, in which are the oil cells, and macerate the gratings in alcohol for an indefinite time. In the writer's experience, it is impossible to grate the peel without tearing off some of the inner, white layer, which contains the bitter principle, and which spoils the softer orange flavor. The exercise of care, with some sacrifice of the oil cells to be on the safe side, will reduce this danger to a minimum, and produce a tincture which will be very satisfactory. But if the peel be shaved instead of grated, taking care to cut only through the oil cells, and not include any of the white portion, the results are more satisfactory in several particulars. Shaving the peel can be accomplished more quickly and easily than grating, if the following plan be followed: The fruit is peeled, and the peel cut into strips not exceeding half an inch in width. These are laid in turn upon a board or other flat surface, held with the fingers of one hand, and the yellow layer can be shaved off at almost a stroke, with a sharp knife. When one has become accustomed to the operation it can be done rapidly, and with no danger of getting the bitter flavor. If a large number of oranges are to be treated at a time, there is a machine in the market which is not expensive and is

operated by hand, and which will shave off the peel from a box of oranges or lemons, in any desired thickness, at the rate of about a box an hour.

Furthermore, a tincture made from the cut peel seldom separates oil globules on standing, while one made from grated peel always does. Shaving the peel thus has a three-fold advantage: in ease and rapidity of operation, in greater security of flavor, and in a more permanent tincture.

To secure uniform results the strength of the tincture should be definite. The shaved portions of the peel are weighed, and 2 c.c. of alcohol are poured over them, in a wide-mouthed bottle, for each gramme of peel. After macerating forty-eight hours, the liquid is drained off through a filter, and the peel rinsed well with just sufficient alcohol to obtain a 50 per cent. tincture through the filter. A tincture so made will keep without change of flavor many months, and produce superior results in elixirs and other uses.

But while the use of tinctures of fresh fruits will improve the elixir, there is still a lack of vigor and freshness in the flavor. Flavors, like perfumes, need to be developed and strengthened to produce the best results.

Wine is the agent needed in this case. What musk is to a perfume, so will wine be to our elixir. A moderate amount will develop and brighten the orange flavor without imparting a vinous quality. Twelve and a half per cent. of wine in the elixir will bring out the orange and freshen its qualities without the wine being itself noticeable. If more than this be added the wine becomes prominent and the orange is reduced.

Then comes the question of the quality and kind of wine to be preferred.

Through the kindness of Messrs. Duroy and Haines, I have been enabled to compare the effects of ten different varieties of wines on this elixir. The wines tried were a port, malaga and claret of the red wines, and muscatel, tokay, angelica, sweet and dry catawba, two qualities of sherry and a "non-sparkling" champagne.

These were all used in the same proportions, and with the same tinctures of orange and lemon, and have been compared repeatedly during the past three to four months.

There is first a notable difference between the light and the heavy wines in the elixirs. The light wines blend perfectly with the

orange, and lose their individuality, while brightening the elixir. The heavy wines impart a heavy quality to the elixir which is foreign to an orange, though the wines themselves are not prominent.

My own preference is as follows: First, the muscatel, and this preference has been shared by most of the friends whom I have asked to make comparison. Next, the tokay, catawba (no real difference between the sweet and dry varieties) and angelica. These four are difficult to choose between, the preference depending largely upon the order in which they are examined. In fact, they are all a close second to the muscatel, and an elixir made with any one of these five light wines is satisfactory.

The sherry and "champagne" are less satisfactory. They do not blend as well, and they impart the heavier quality. If the two qualities of sherry tried can be taken as a criterion, the quality of wine used is secondary to the variety, so far as securing a bright and smooth flavor is concerned. The orange softens the rawness of a new wine, and the quality is less noticeable in the blend.

The red wines would not be chosen unless a colored elixir is desired. Like the sherry, they impart a heavy flavor and do not blend perfectly. The malaga blends the best of the three, but its color is not as good, having a marked brownish tinge. Claret produces a brilliant red elixir, but its flavor is not good. It is the poorest of the whole list in this regard. Port is fairly satisfactory in both color and flavor. But many would prefer to make the elixir with a white wine and color it to suit.

An elixir made with tinctures of the fresh fruits will, without wine, have a yellow or straw-tint, and the addition of the whitest wine (which is never white or colorless) will, of course, deepen the shade, making an amber or straw-colored elixir. Color is not of itself objectionable so long as it is fairly uniform.

The following formula will produce an elixir corresponding to the official aromatic elixir in character and strength, but improved in vigor and delicacy:

Tincture of fresh orange peel, 50 per cent.	15 c.c.
Tincture of fresh lemon peel, 50 per cent.	3 c.c.
Oil of coriander	0·25 c.c.
White wine	125 c.c.
Deodorized alcohol	230 c.c.
Syrup	375 c.c.
Distilled water, sufficient to make	1,000 c.c.

Dissolve the tinctures and oil in the alcohol, add the wine and then the syrup. Then add gradually, with agitation, enough distilled water to make 1,000 c.c. of mixture. Diffuse 10 grammes of purified talcum through the liquid, and shake it occasionally during four to seven days; then filter, returning the first portions to the filter until it comes through clear.

The cost of this elixir will be but slightly greater than the present official formula. In a number of trials, six oranges of fair size, such as are usually sold for table use, have made 100 to 120 c.c. of tincture. Six lemons will average to give 75 to 100 c.c. of tincture. Thus, three average oranges and one lemon will suffice for a gallon of elixir, so far as the fruit is concerned. The wine replaces a part of the alcohol, and the additional cost of this is small, while the advantage is great. And above all, an elixir is obtained which is really redolent of orange, and in which the average person will suspect nothing foreign.

JAMES SMITHSON.[1]

By William B. Marshall.

James Smithson, the founder of the Smithsonian Institution, was an Englishman, born in 1765. Until about the age of thirty-seven he was known by the name of James Lewis Macie (Macie being his mother's name), but later he obtained authority to change his name to Smithson. The exact date of the change is not known, but it seems to have been made at some time between 1794 and 1802. In the will of his half-sister, Dorothy Percy, dated 1794, he was designated as Macie. His second paper before the Royal Society was read November 18, 1802, and was published in the *Philosophical Transactions* under the title "A Chemical Analysis of some Calamines," by James Smithson, Esquire.

He was a natural son of the first Duke of Northumberland, formerly Hugh Smithson, who, upon the death of his grandfather, in 1729, succeeded to a baronetcy and became Sir Hugh Smithson. In 1749 Sir Hugh married Elizabeth Percy, and, later, upon becom-

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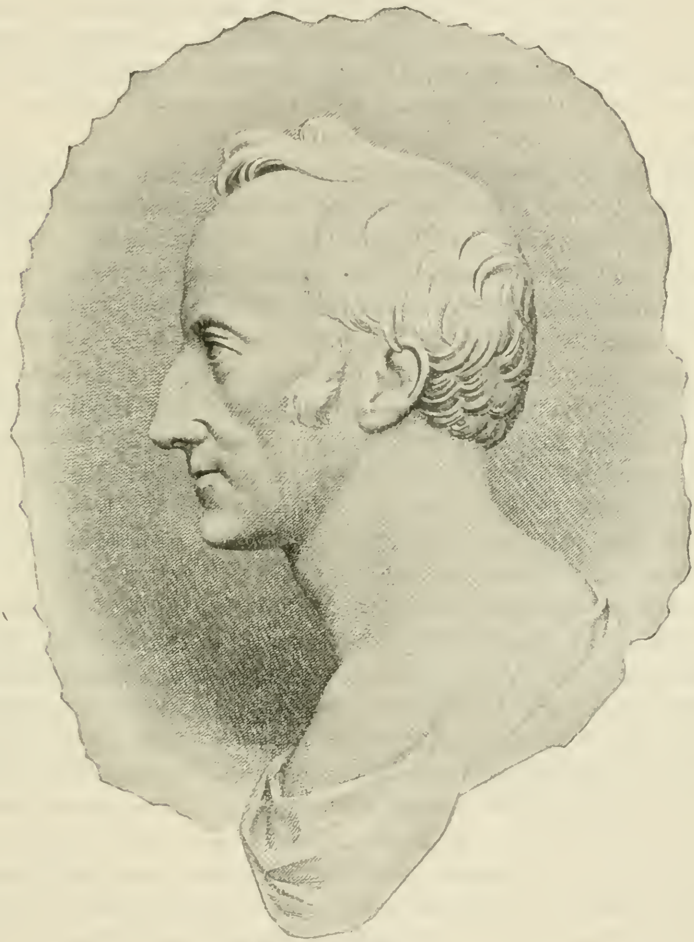
[1] This sketch is founded upon, and largely quotes from, a paper by Samuel Pierpont Longley on "James Smithson," published as part of "The Smithsonian Institution, 1846–1896. The History of its First Half Century. Edited by G. Brown Goode."

ing Duke of Northumberland, he took the name of Percy by authority of an act of Parliament. He attained the peerage not through inheritance but because of his own abilities.

At the time of his birth James Smithson's mother was Elizabeth



JAMES SMITHSON.

Hungerford Keate Macie, widow of James Macie, a country gentleman living at Weston, near Bath, England. Mrs. Macie was a cousin of Elizabeth Percy, the wife of the Duke of Northumberland. She was a grandniece of Charles, Duke of Somerset, through whom she was descended from Henry the Seventh. According to an

unverified story, Mrs. Macie had sought a divorce from her husband in the hope that she might wed the Duke of Northumberland, but Macie prevented.

Concerning his parentage Smithson himself wrote:

"The best blood of England flows in my veins; on my father's side I am a Northumberland, on my mother's I am related to kings; but this avails me not, *my name shall live in the memory of man when the titles of the Northumberlands and the Percys are extinct and forgotten.*"

That this will become true is almost as certain as that the sun will continue to rise and set, but at the time it was written Smithson could not have foreseen that his name was to be handed down through the ages by means of the Smithsonian Institution. At the time he must have had in mind some high endeavor which would make him lastingly famous. A glance at his will shows that he recognized the ties of kinship and bequeathed his fortune to his nephew's use for life, and to the children of that nephew (should there be any) absolutely and forever. Only in case of failure of issue on the part of the nephew was the Smithsonian Institution to be established.

Smithson's family on the father's side seems to have had a liking for America, as witness the following:

He himself provided for the establishing in America of an institution bearing his name. His father, Duke of Northumberland, actively opposed the war of '76 with the colonies, and obtained leave of absence for his son, Lord Percy, who had been ordered to America. Lord Percy, however, felt himself in duty bound to decline the leave and accompanied the British troops to this country in 1774, although against his inclination. General Gage placed him in command of the camp at Boston, whence he wrote to his father on July 5, 1774: "As I cannot say this is a business I very much admire, I hope it will not be my fate to be ordered up the country. Be that as it may, I am resolved cheerfully to do my duty as long as ever I continue in the service. If I do not acquire any degree of reputation in it, it will be my misfortune, but shall never be my fault."

It was his fate to be ordered up country, as he was sent to cover the retreat of the troops which had been on the expedition to Concord and which had the famous unpleasantness with the colonists at Lexington, April 19, 1775. At the time he wrote to his father: "I

had the happiness of saving them from inevitable destruction, and arriving with them at Charleston, opposite Boston, at 8 o'clock last night; not, however, without the loss of a great many, having been under an incessant fire for fifteen miles. The rebels, however, suffered much more than the king's troops."

In 1782, at the age of seventeen, Smithson matriculated at Pembroke College, Oxford. Not much is known about his student days, except that he was noted for diligence and good scholarship, and that he was deeply interested in chemistry and mineralogy, in which studies he was the best student in his class. In 1784, he made a geological tour through Oban, Staffa and the western isles, with De St. Fond, "the celebrated philosopher," and the Italian count, Andrioni, in which they studied mining and manufacturing processes. Most of his vacations were devoted to excursions for collecting minerals and ores, which it was his favorite occupation to analyze.

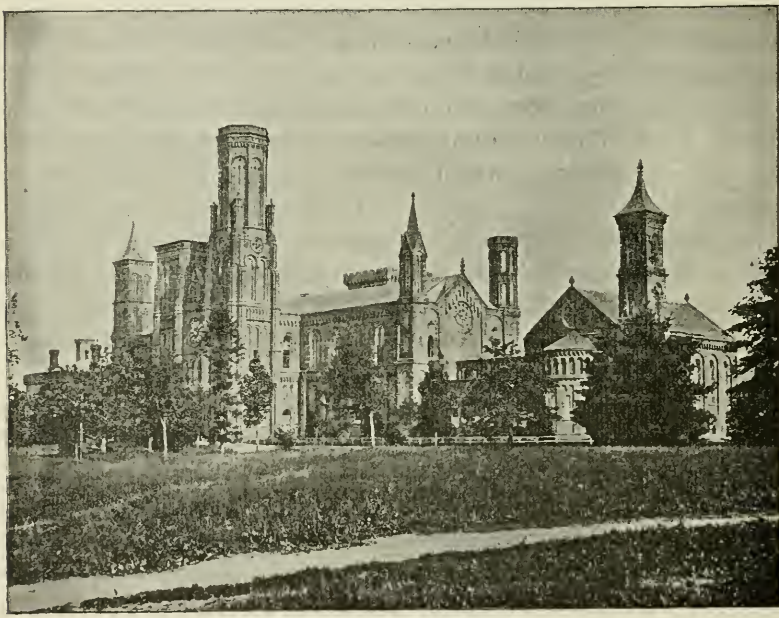
He graduated at Pembroke College with the degree of Master of Arts on May 26, 1786. On April 27, 1787, he was admitted as a Fellow of the Royal Society, before which, in 1791, he read his first scientific paper, entitled "An Account of Some Chemical Experiments on Tabasheer."

Not much is known of Smithson's after-career. In his later days, he resided in Paris, and was the victim of ill health. That he devoted much time to chemical investigations is shown by the published papers of which he was the author. His published writings were twenty-seven in number, of which eight were published in the *Philosophical Transactions* of the Royal Society between 1791 and 1807; one in the *Philosophical Magazine* in 1807; and eighteen in *Thomson's Annals of Philosophy*, between 1819 and 1825.

Prof. Frank W. Clarke, chief chemist of the United States Geological Survey, has placed the following estimate on these papers:

"The most notable feature of Smithson's writings, from the standpoint of the modern analytical chemist, is in the success obtained with the most primitive and unsatisfactory appliances. In Smithson's day, chemical apparatus was undeveloped, and instruments were improvised from such materials as lay readiest to hand. With such instruments, and with crude reagents, Smithson obtained analytical results of the most creditable character, and enlarged our knowledge of many mineral species. In his time, the native carbon-

ate and silicate of zinc were confounded as one species under the name 'calamine;' but his researches distinguish between the two minerals, which are now known as Smithsonite and calamine, respectively. To theory, Smithson contributed little, if anything; but, from a theoretical point of view, the tone of the writings is singularly modern. His work was mostly done before Dalton had announced the atomic theory; and yet Smithson saw clearly that a law of definite proportions must exist, although he did not attempt to



Smithsonian Institution.

account for it. His ability as a reasoner is best shown in his paper upon the Kirkdale bone cave, which Penn had sought to interpret by reference to the Noachian deluge. A clearer and more complete demolition of Penn's views could hardly be written to-day. Smithson was gentle with his adversary, but none the less thorough for all his moderation. He is not to be classed among the leaders of scientific thought; but his ability and the usefulness of his contributions to knowledge cannot be doubted."

His published papers were as follows:

IN THE PHILOSOPHICAL TRANSACTIONS.

"An Account of Some Chemical Experiments on Tabasheer." (Vol. lxxxi, part ii, p. 368, 1791.)

"A Chemical Analysis of Some Calamines." (Vol. xciii, p. 12, 1802.)

"An Account of a Discovery of Native Minium." (Vol. xcvi, part i, p. 267, 1806.)

"On the Composition of the Compound Sulphuret from Hull Boys, and an Account of its Crystals." (Vol. xcviii, p. 55, 1808.)

"On the Composition of Zeolite." (Vol. ci, p. 171, 1811.)

"On a Substance from the Elm Tree: Called Ulmin." (Vol. ciii, p. 64, 1813.)

"On a Saline Substance from Mount Vesuvius." (Vol. ciii, p. 256, 1813.)

"A Few Facts Relative to the Coloring Matter of Some Vegetables." (Vol. cviii, p. 110, 1817.)

IN THE PHILOSOPHICAL MAGAZINE.

"On Quadruple and Binary Compounds: Particularly Sulphurets." (Vol. xxix, p. 275, 1807.)

IN THOMSON'S ANNALS OF PHILOSOPHY.

"On a Native Compound of Sulphuret of Lead and Arsenic." (Vol. xiv, p. 96, 1819.)

"On a Native Aluminate of Lead: or Plomb Gomme." (Vol. xiv, p. 31, 1819.)

"On a Fibrous Metallic Copper." (Vol. xvi, p. 46, 1820.)

"An Account of a Native Combination of Sulphate of Barium and Fluoride of Calcium." (Vol. xvi, p. 48, 1820.)

"On Some Capillary Metallic Tin." (Vol. xvii; new ser., vol. i, p. 271, 1821.)

"On the Detection of Very Minute Quantities of Arsenic and Mercury." (Vol. xx; new ser., vol. iv, p. 127, 1822.)

"Some Improvements in Lamps." (Vol. xx; new ser., vol. iv, p. 363, 1822.)

"On the Crystalline Form of Ice." (Vol. xxi; new ser., vol. v, p. 340, 1824.)

"A Means of Discrimination Between the Sulphates of Barium and Strontium." (Vol. xxi; new ser., vol. v, p. 359, 1823.)

"On the Discovery of Acids in Mineral Substances." (Vol. xxi; new ser., vol. v, p. 384, 1823.)

"An Improved Method of Making Coffee." (Vol. xxii; new ser., vol. vi, p. 30, 1823.)

"A Discovery of Chloride of Potassium in the Earth." (Vol. xxii; new ser., vol. vi, p. 258, 1823.)

"On Some Compounds of Fluorine." (Vol. xxiii; new ser., vol. vii, p. 100, 1824.)

"An Examination of Some Egyptian Colors." (Vol. xxiii; new ser., vol. vii, p. 115, 1824.)

"Some Observations on Mr. Penn's Theory Concerning the Formation of the Kirkdale Cave." (Vol. xxiv; new ser., vol. viii, p. 50, 1824.)

"A Letter from Dr. Black Describing a Very Sensible Balance." (Vol. xxiv; new ser., vol. x, p. 52, 1825.)

"A Method of Fixing Crayon Colors." (Vol. xxvi; new ser., vol. x, p. 236, 1825.)

All the above were reprinted in vol. xxi (1879) of the *Smithsonian Miscellaneous Collections*, under the title "The Scientific Writings of James Smithson." They consist of about 117 printed pages.

His published writings did not represent all of his work, as 200 of his manuscripts (covering a wide range of subjects—history, the arts, languages, rural pursuits, etc.), were forwarded to the United States with his effects. All these, with the exception of one small volume, were burned in the fire at the Smithsonian Institution in 1865. His cabinet, destroyed at the same time, consisted of a choice collection of minerals of 8,000 or 10,000 specimens, and included examples of most of the meteorites which had fallen in Europe during several centuries.

Smithson's will was a model of simplicity. In it he describes himself thus:

"I, James Smithson, Son to Hugh, first Duke of Northumberland, & Elizabeth, Heiress of the Hungerfords of Studley, & Niece to Charles, the proud Duke of Somerset, now residing in Bentinck Street, Cavendish Square, do this twenty-third day of October, one thousand eight hundred and twenty-six, make this my last Will and Testament."

His will directed that an annuity of £100 should be paid his ormer servant, John Fitfall, during life; that sums of money which

had been lent to another former servant, Henry Honore Sailly, should be allowed to remain with the debtor for five years from the date of the will at 5 per cent. per annum. The income of his estate, with the exception noted above, was bequeathed to his nephew, Henry James Hungerford, who was empowered to make a jointure should he marry. To Hungerford's children, should he have any, the estate was bequeathed absolutely and forever in such shares as the father might care to direct, and, should he fail to direct such division, then the estate was to be divided among the children

United States National Museum.

in such shares as the Lord Chancellor might deem proper. The clause which is of especial interest, is the following: "In the case of the death of my said nephew without leaving a child or children, or the death of the child or children, he may have had under the age of twenty-one years, or intestate, I then bequeath the whole of my property, subject to the Annuity of One Hundred Pound to John Fitfall, & for the security & payment of which I mean Stock to remain in this Country, *to the United States of America, to found at Washington, under the name of the Smithsonian Institution, an Establishment for the increase & diffusion of knowledge among men.*"

It would be difficult to excel the simple majesty of the last few words of that clause. Possibly no higher tribute has ever been paid to the honor of the people of the United States than the absolute trust which Smithson reposed in them when he placed in their hands what was at that time a very large fortune (about one-half million dollars) without hedging it all about with directions, restrictions and safeguards of various kinds. His wishes as to trustees, place, name, purpose and beneficiaries are all told in twenty-eight words, and those few words have afforded the means for wonderfully increasing the stock of human knowledge of all kinds, and the whole world has been the beneficiary. Could Smithson at this day view the results of his benefaction, he must needs say that they have far exceeded any expectation which he may have cherished. The Smithsonian Institution, founded in 1846, is, in itself, a grand memorial to him, and much grander still when it is remembered that it has called into being and has under its care the National Museum, the Bureau of American Ethnology, the National Zoological Park, the Bureau of International Exchanges, and the Astrophysical Observatory, and that it has mothered various other of the scientific bureaus of the Government's work. Probably no trust has ever been more honorably and successfully administered, and certainly none has had so great effects both at home and to the far corners of the earth. The seal of the Smithsonian Institution contains the words from Smithson's will, "For the increase and diffusion of knowledge among men," and the words *per orbem* have been added.

Smithson died June 27, 1829, at Genoa, Italy, and was buried in the English cemetery on the heights of San Benigno. A few years ago the Smithsonian Institution placed a tablet on his tomb and a similar tablet in the English church in the city of Genoa.

Last January, through the agency of Prof. Alexander Graham Bell, acting on behalf of the Regents of the Smithsonian Institution, his remains were brought to this country and are to find a final resting-place in the Smithsonian Park, under the shadow of the institution which he founded.

The United States despatch-boat "Dolphin" was sent to New York to receive the remains upon their arrival in this country and to bring them to Washington. Here they were placed upon a gun-carriage and with a military escort were brought to the Institution

to be received there with simple but impressive ceremony. At the present time they rest in the Regents' room of the Smithsonian Institution, awaiting the selection of a proper spot for sepulture.

NOTES FROM JOSEPH INCE'S BOOK ON ELEMENTARY DISPENSING PRACTICE.

By M. I. Wilbert.

Mr. Joseph Ince has embodied such a wealth of interesting personal opinions, as well as suggestive and practical ideas, in his little book on "Elementary Dispensing Practice" (Amer. Jour. Pharm., 1904, p. 145), that it was thought that a few extracts or random notes might prove interesting to practical pharmacists in this country. In the preface Mr. Ince, himself nearly, if not quite, an octogenarian gives a description of what is evidently his ideal for a dispenser. He says: "Many years ago I stood by the side of an excellent and experienced dispenser whose example was a perpetual lesson in this branch of pharmaceutical education. His work was rapid, for he was of the opinion that slow dispensing by no means leads to accuracy. His method was the very soul of order, for he returned every bottle to its place as soon as done with, and in the very press of business carefully read his prescriptions and then wrote his labels, which he kept constantly before him so as to avoid the smallest chance of error. Save the final wrapping up and sealing, each separate piece of work was finished out of hand, judgment being used as to what should be attempted first."

Having this ideal in mind, it is little wonder that Mr. Ince has profited by his experience and is able to tell us how we ourselves may become more efficient in this particular branch. This he does a little further on, when he tells us that: "Success in any branch of knowledge depends on the perpetual culture of the talent of observation. This is particularly applicable to the would-be dispenser, who should train himself to recognize the chief preparations, liquid and solid, which he sees around him, including drugs in common use.

"He will dispense best who during his apprenticeship has become familiar with the physical characteristics, general behavior and ordinary doses of the various drugs, chemicals and preparations with which he comes in contact."

Under prescription reading Mr. Ince says: "When a physician writes a prescription for a patient in the well-known semi-classical manner, the dispenser must be able to understand what has been written before he can rightly fulfil the intentions of the prescriber.

"These intentions are expressed in technical contracted Latin, definite and perfectly intelligible when once mastered; far more definite than instructions conveyed in English, and less liable to be misunderstood."

The importance of being thoroughly familiar with these various technical and usually much-abbreviated words and terms is well illustrated by two letters that have but recently appeared in *American Medicine* (Dr. J. M. Miller, *Am. Med.*, 1904, p. 380, and Dr. L. D. Sheets, *Am. Med.*, 1903, p. 1014), in which the writers complain that the Latin term *ad* had been repeatedly mistaken for the English word add. Mr. Ince calls attention to this same possibility, and says that the difference between ad and add should be carefully noted. "*Ad* is a preposition which governs the accusative case and means up to, or up; *Q. S. quantum sufficiat* (as much as may be sufficient) often precedes *ad*. Add, when used in connection with Latin abbreviations or directions, is itself an abbreviation of the Latin word *adde* (add thou)." More often, however, it is used as the English word add.

Considerable attention is given to the discussion of the use and non-use of heat in making simple solutions The application of heat to effect solution demands considerable knowledge of the physical properties of drugs and chemicals. "It is obvious that to apply heat to substances that are themselves readily soluble, or are readily decomposed or volatilized, would be considered poor dispensing and would betray a want of common sense."

In this connection it is also quite necessary to have considerable knowledge of the comparative solubility of substances in hot and in cold water. Potassium chlorate, for instance, being sparingly soluble in cold water and readily soluble in boiling water, is best treated without heat to avoid the large crystals that are invariably formed by this substance on cooling.

Of powders Mr. Ince says that they should be weighed out one by one: "It is bad practice to take the total weight ordered and divide it subsequently into the required number by the aid of a spatula, not by the scales and weight. It is worse to dip out grain

doses of powdered opium from a wide-mouth stock-bottle thinking no evil." In speaking of mixing powders he says that "powders dispensed on the usual small scale are better mixed with a paper or palette knife on paper and sifted, than by titration in a mortar."

"In compound powders ingredients ordered in smallest quantities should be added first and larger quantities last."

Under pill excipients Mr. Ince gives the formula for a number of mixtures that may prove useful, and are at least interesting.

"Hydrated glycerin: Glycerin, 4; distilled water, 1; mix. Glucose excipient: Glucose, 12; glycerin, 4; distilled water, 1; mix. Honey excipient: Clarified honey, 2; distilled water, 1; mix. Proctor's paste: Glycerin, 9 c.c.; powdered tragacanth, 3 grammes; distilled water, 4 c.c.; mix. Triturate the tragacanth with the glycerin and then add the water."

Among other excipients he recommends the use of manna as having many special applications. Among absorbents he recommends powdered licorice, precipitated calcium phosphate and calcined magnesia.

Mr. Ince lays much stress on the desirability of incorporating every potent remedy that is capable of solution in that state so as to be absolutely sure of the particles being thoroughly subdivided.

In speaking of ointments he says: "It is indispensable that the active ingredients be reduced to a perfectly miscible condition, and wherever possible added in solution.

"All crystalline bodies incorporated into an ointment need the utmost care in dispensing; they should be reduced to an impalpable powder, dissolved when possible, but always rendered absolutely smooth."

In making ointments by fusion it is necessary to know the relative melting points of the bases and to regulate and adjust the order of melting so that the substance requiring the highest degree of heat is melted first, the remaining bases being added in the sequence suggested by their melting points, so that the necessary heat may be gradually reduced and in this way avoid burning or scorching the most delicate ingredients.

Under "Quisquilliæ" that might have quite properly been called "that which is valuable," Mr. Ince has arranged a number of interesting suggestions, from which we have taken the following:

"A mortar should not be used to dissolve a readily soluble salt or substance.

"No metallic substance should come in contact with unguentum hydrargyri nitratis.

"Chloroform and menthol are insoluble in glycerin.

"A new label must on no account be pasted over an old one; former directions and labels must be removed.

"Hydrochloric acid is a safe expedient for removing stains from the hands.

"The art of keeping tinctures of a uniform color is to reserve an eighth part of the old make and add to it the fresh preparation. Tincture of orange-peel may be taken as an example.

"Tabulate doses of potent remedies; the rest may be learned by constant reference.

"Hesitate before giving an opinion as to whether a preparation is used or not. This is an affair of locality; if in your district there is no demand for a certain article, it may be extensively used elsewhere.

"Before actual dispensing, write the labels. When a prescription contains various preparations, make the suppositories first (if any) and set any infusion not in readiness. Time is thus economized.

"It is against all rules of pharmacy to substitute one substance for another in case of being out of a particular drug."

THE METRIC SYSTEM.

SOME NOTES ON HERBERT SPENCER'S OBJECTIONS TO THE USE OF DECIMALS.

By M. I. Wilbert.
Apothecary at the German Hospital, Philadelphia.

The objections made by the late Herbert Spencer to the introduction of the metric system of weights and measures into England are in their nature so far-reaching that some additional information regarding them may not be out of place at the present time. This is particularly true in view of the fact that a bill for the speedy and compulsory introduction of the metric system has but recently passed second reading, without a single objection, in the British House of Lords.

That Mr. Spencer himself was sincere in his objections is evidenced from the provisions he made in his last will and testament; where it was found that he directed that if at any time, after his death, a concerted effort should be made to introduce a decimal system of

weights and measures, or a decimal monetary system, into Great Britain, his objections to such a system should be republished, in pamphlet form, and distributed among members of Parliament.

As noted in the article recently published in this JOURNAL (A. J. P., 1904, page 125), Mr. Spencer's objections first appeared as a series of anonymous letters, four in number, in the *London Times*.

They were republished in this country, by permission, under Mr. Spencer's name, in the June (1896) number of Appleton's *Popular Science Monthly*.

The same Journal, in October, 1896, published an article by Prof. J. C. Mendenhall, President of the Worcester Polytechnic Institute, in which the latter reviews the arguments advanced by Mr. Spencer and refutes many of the statements made by him, particularly those relating to the accuracy or lack of accuracy in the standard units of the metric system.

In Professor Mendenhall's paper the futility of many of the arguments advanced by Mr. Spencer in his several letters is gone into at some length, but as neither the arguments nor the answers are of much interest to us as pharmacists they need not be repeated here at length.

Some exception, however, might well be made to the basic or real objection advanced by Mr. Spencer to the metric system. This appears first in the second letter of the series, where it develops that his objections are not directed so much against the standards of the metric system as they are against the introduction of any system that is decimal in character, feeling, as Mr. Spencer did, that our system of numeration by ten, and multiples of ten, was not in harmony with the more advanced needs of modern civilization. It is in this same letter that he suggests the great advantage of a duodecimal system of numeration; largely on account of the number of factors by which twelve or a multiple of twelve would be divisible.

Singularly enough he answers his own argument in a most satisfactory way when he says, "Do I think this system will be adopted? Certainly not at present—certainly not for many generations," and adds: "In our days the mass of people, educated as well as uneducated, think only of immediate results; their imaginations of remote consequences are too shadowy to influence their acts."

That Mr. Spencer had a proper appreciation of the inherent advantages of a rational system of weights and measures that was, or

would be, generally adopted, and that he was not above recognizing the fact that the metric system had done much toward achieving this ideal, is evident from the following quotation.

In speaking of the history and development of the metric system, he says: "The idea was a great one, and, allowing for the fundamental defect on which I have been insisting, it was admirably carried out. As this defect does not diminish its great convenience for scientific purposes, the system has been gradually adopted by scientific men all over the world; the great advantage being that measurements registered by a scientific man of one nation are without trouble made intelligible to those of another."

Recognizing and admitting the numerous advantages that scientific men have derived from the introduction and use of the metric system, Mr. Spencer was, nevertheless, not willing to admit that the small tradesman or his customers would or could appreciate or use a system of weights and measures, or a system of coinage, based on a decimal plan, without seriously interfering with their ability to do business.

This line of argument sounds strange to us in this country, where, we think at least, we have adapted ourselves to a decimal system of currency.

How complicated our monetary system appeared to Mr. Spencer is evidenced when he says, referring to quotations on the New York Stock Exchange: "Are the quotations of prices in dollars, tenths, and cents? Not at all. They are in dollars, halves, quarters and eighths." "That is to say, the decimal divisions of the dollar are entirely ignored, and the division into parts produced by halving, re-halving, and again halving, is adopted."

In this practice Mr. Spencer does not recognize a possible adaptation of the decimal system of numeration, but accepts it as evidence of an impediment or even—retrogression.

The same line of thought is evident when he quotes from the communication of a French correspondent, who says: "By adopting the decimal metric system, we have not made the old denominations to disappear entirely, but we have greatly reduced their use." Instead of accepting this as evidence of the adaptability of metric weights and measures, Mr. Spencer puts it forward as an argument against the popularity of the decimal system among the French people. This objection to our decimal system of numeration

has led Mr. Spencer to assert that rather than adopt a universal system of weights and measures based on a decimal plan, " It will be far better to submit for a time to the evils which our present mixed system entails."

In conclusion I should like to say that few people will disagree with Mr. Spencer as to the possible advantage that might be derived from a system of numeration more adaptable than our present system of decimals, and but few, very few, will differ from him as to the impracticability of introducing such a system at the present time ; be it octonary, duodecimal, or sexadecimal.

Many, particularly in this country, must fail to see how a monetary system, or a system of weights and measures, based on a decimal plan, could in any way impede trade or interfere with the possible adoption of any improved system of numeration that might be devised in the future.

THE GENUS EUCALYPTUS.

By Henry Kraemer.

One of the most interesting genera of plants both from a botanical and economical point of view is that of eucalyptus. When the late Baron F. von Mueller prophesied that this genus would " play a prominent part for all time to come in sylvan culture of vast tracts of the globe ; and for hard-wood supplies, for sanitary measures, and for beneficent climatic changes all countries within the warmer zones will with appreciative extensiveness have to rely on our eucalypts during an, as yet, uncountable period," he probably little realized that in twenty-five years after the publication of his classical work on " Eucalyptographia " it would already be the most extensively cultivated genus of forest trees, and also recognized to be the most valuable.

During the past year or so several very valuable monographs on the eucalypts have appeared, and it is the purpose of the author of the present paper to review these publications together. J. H. Maiden[1] is publishing a " Critical Revision of the Genus Eucalyptus." This work is appearing in parts, and the remaining numbers will be issued as rapidly as the plates can be made, three parts

[1] J. H. Maiden, Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney.

having already appeared. Baker and Smith[1] have published a large monograph on the genus, their work having special regard to the essential oils yielded by the various species, and Alfred James McClatchie has published an interesting monograph[2] on the eucalypts cultivated in the United States.

The genus Eucalyptus was named by L'Heritier in 1788, from the two Greek words meaning "I cover well," "in allusion to the operculum or lid which covers the calyx until the stamens are fully formed." The plants are evergreen and vary from shrubs to trees of enormous height, probably some of them being the highest trees known. Kerner[3] gives the height as 140 to 152 metres. The leaves frequently vary in shape and in position on both young and mature trees; they are fixed vertically, and not horizontally as the leaves of our trees, the petiole being twisted. The leaves furthermore contain large oil-secreting reservoirs. The flowers are arranged in cymes or axillary umbels and are devoid of petals; the usually whitish stamens are inflexed in the bud and expand when the operculum is removed, giving the name as already stated to the genus. The fruit is a 3- to 6-celled truncated capsule, or pyxis. The seeds are small and very numerous, the sterile ones predominating; this is no doubt one reason why there has been so much difficulty in producing seedlings.[4]

With a genus of so many species and numerous varieties it was to be expected that there would be considerable confusion in regard to the accurate determination of its members. Tate and Luehman give prominence to the fruit for purposes of classification. Maiden, however, says that all of its characters display a puzzling amount of variation, and concludes that for herbarium work the best characters are afforded by the anthers and fruits; whereas the scientific forester will be largely guided by the nature of the bark and timber. Baker and Smith, in addition to morphological characters, base their deductions on the chemical properties and physical characters of oils, dyes, kinos, etc. These authors have probably the most

[1] Richard T. Baker, Curator and Economic Botanist of the Technological Museum, New South Wales; and Henry G. Smith, Assistant Curator and Chemist of the Technological Museum, New South Wales.

[2] This is Bulletin No. 35, of the Bureau of Forestry of the U. S. Department of Agriculture.

[3] "Natural History of Plants," Vol. I, p. 722.

[4] McClatchie, *loc. cit.*, p. 44.

comprehensive view of the subject, and are less likely to err in their conclusions, as experience covering many years has shown them that a species founded on field studies, the usual morphological data, as well as structure and nature of cell contents, is practically constant in specific characters. This is in a certain sense the most interesting part of their work. It is not at all unlikely that the next important classification of plants will be based largely on such histological and physiological data as Baker and Smith have considered in their studies on this single genus. Engler and Prantl have attempted to utilize in a measure this kind of information on the entire plant kingdom, but it has been unsatisfactory, because the work done is not sufficient and in most cases still requires confirmation. Baker and Smith have made an excellent beginning, and have set the pace for all writers of monographs on other plant genera.

Baker and Smith have divided the eucalypts into the following groups, based on the character of the oils they yield:

GROUP I.—Eucalypts which give an oil consisting LARGELY OF PINENE, without phellandrene, and in which eucalyptol is almost or quite absent: *Eucalyptus tesselaris*, *E. trachyphloia*, *E. terminalis*, *E. corymbosa*, *E. intermedia*, *E. eximia*, *E. botryoides*, *E. robusta*, *E. saligna*, *E. nova-anglica*, *E. umbra*, *E. dextropinea*, *E. Wilkinsoniana* and *E. lævopinea*.

GROUP II.—Eucalypts which yield an oil consisting principally of PINENE and EUCALYPTOL, but in which the latter constituent does not exceed 40 per cent., phellandrene being absent: *Eucalyptus Baeuerleni*, *E. propinqua*, *E. affinis*, *E. paludosa*, *E. lactea*, *E. rubida*, *E. intertexta*, *E. maculata*, *E. microcorys*, *E hemilampra*, *E. quadrangulata*, *E. conica*, *E. Bosistoana*, *E. eugenioides* and *E. paniculata*.

GROUP III, CLASS A.—Eucalypts which yield an oil consisting principally of eucalyptol and pinene, and in which the EUCALYPTOL EXCEEDS 40 PER CENT., phellandrene being absent: *Eucalyptus resinifera*, *E. polyanthema*, *E. Behriana*, *E. Rossii*, *E. pendula*, *E. dealbata*, *E. tereticornis* var. *linearis*, *E. rostrata* var. *borealis*, *E. maculosa*, *E. camphora*, *E. punctata*, *E. squamosa*, *E. Bridgesiana*, *E. goniocalyx*, *E. bicolor*, *E. viminalis* var. (*a*), *E. populifolia*, *E. longifolia*, *E. Maideni*, *E. globulus*, *E. pulverulenta*, *E. cinerea*, *E. Stuartiana*, *E. Stuartiana* var. *cordata*, *E. Morrisii*, *E. Smithii* and *E. sideroxylon*.

GROUP III, CLASS B.—Eucalypts which yield an oil containing OVER 40 PER CENT. OF EUCALYPTOL, but in which the pinene is dimin

ishing and AROMADENDRAL is making its appearance, thus approaching the typical "Boxes," phellandrene being absent: *Eucalyptus Cambagei, E. polybractea, E. dumosa, E. oleosa, E. cneorifolia* and *E. stricta.*

GROUP III, CLASS C.—Eucalypts which yield an oil containing over 40 PER CENT. of EUCALYPTOL, but in which PHELLANDRENE is making its appearance, thus approaching the phellandrene oils: *Eucalyptus melliodora* and *E. ovalifolia* var. *lanceolata.*

GROUP IV.—Eucalypts which yield an oil consisting largely of *eucalyptol, pinene* and *aromadendral,* but in which the EUCALYPTOL DOES NOT EXCEED 30 PER CENT., and in which phellandrene is absent: *Eucalyptus tereticornis, E. punctata* var. *didyma, E. gracilis, E. viridis, E. Woolsiana, E. albens* and *E. hemiphloia.*

GROUP V.—Eucalypts which yield an oil consisting of PINENE, EUCALYPTOL and PHELLANDRENE, but in which eucalyptol does not exceed 30 per cent.: *Eucalyptus viminalis, E. rostrata, E. ovalifolia, E. Dawsoni, E. angophoroides, E. fastigata, E. macrorhyncha, E. capitellata, E. nigra, E. pilularis, E. Planchoniana, E. acmenoides, E. fraxinoides, E. Fletcheri, E. microtheca, E. hæmastoma, E. sideroxylon* var. *pallens, E. creba, E. siderophloia* and *E. melanophloia.*

GROUP VI, CLASS A.—Eucalypts which yield an oil consisting largely of PHELLANDRENE, EUCALYPTOL and the PEPPERMINT KETONE, but in which the eucalyptol does not exceed 30 per cent.: *Eucalyptus piperita, E. amygdalina, E. vitrea* and *E. Luehmanniana.*

GROUP VI, CLASS B.—Eucalypts which yield an oil consisting largely of PHELLANDRENE and the PEPPERMINT KETONE, and in which EUCALYPTOL IS ALMOST, IF NOT QUITE, ABSENT: *Eucalyptus coriacea, E. Sieberiana, E. oreades, E. dives, E. radiata, E. Delegatensis,* and *E. obliqua.*

GROUP VII.—Eucalypts which yield an oil not readily placed in the other groups: *Eucalyptus stellulata, E. Macarthuri, E. aggregata, E. virgata, E. patentinervis, E. apiculata* and *E. citriodora.*

Eucalyptus obtusiflora yielded no oil upon distillation.

After many attempts Baker and Smith were unable to obtain material for oil-distillation of the following species: *Eucalyptus acaciæformis, E. alpina, E. Baileyana, E. incrassata, E. ochrophloia, E. odorata, E. regnans, E. uncinata* and *E. Perriniana.*

The authors have shown in a diagram the probable evolution of the eucalypts as indicated by their studies on the botanical and chemical characters of the genus.

The monograph is an interesting one, with numerous excellent illustrations, and contains very many new facts in addition to an entirely new presentation of the subject. Not the least interesting is the fact that many (nearly thirty) species of Eucalyptus yield an oil resembling that obtained from *E. globulus*, containing over 40 per cent. of eucalyptol, and that the oil of eucalyptus, *e. g.*, *E. globulus*, is the same in character and constituents, no matter where the trees are grown. It has been heretofore supposed that the oils of *E. globulus*, *E. cneorifolia* and a few others, which have been derived from trees growing in the southern States (as Tasmania or South Australia) were superior to those obtained from trees growing elsewhere, as in New South Wales, whereas this preference is in reality due "to the perseverance and persistency of the companies working these species, and especially to the pioneers in the industry having established themselves in the neighboring States." The statement is made that "the demand for oils rich in eucalyptol can now be met by the distillation of species growing in New South Wales and from which the present requirements of the world could be supplied."

It is furthermore of interest, that, according to McClatchie, no less than eight species of the eucalypts, yielding an oil containing over 40 per cent. of eucalyptol, are being cultivated in the United States.

Over forty species of Eucalyptus[1] have been grown successfully in the United States. The following species are adapted to hot, humid regions and will produce useful timber: *Eucalyptus botryoides*, *E. citriodora* and *E. resinfera*.

The following are best adapted to warm, moderately humid regions having light winter frosts, and are most suitable for producing timber valuable for commercial purposes: *Eucalyptus botryoides*, *E. diversicolor*, *E. globulus*, *E. gomphocephala* and *E. tereticornis*.

The following are adapted to situations not excessively warm during summer, but frosty during winter, and are most likely to give good results in the Southwest: *Eucalyptus gunnii*, *E. leucoxylon*, *E. polyanthema*, *E. rudis* and *E. tereticornis*.

The following are adapted to dry regions free from heavy frosts, and produce valuable timber: *Eucalyptus corynocalyx*, *E. creba*, *E. diversicolor*, *E. globulus*, *E. leucoxylon*, *E. polyanthema*, *E. sideroxylon* and *E. tereticornis*.

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[1] McClatchie, *loc. cit.*, p. 85.

The following are adapted to moderately moist mountain situations: *Eucalyptus coriacea*, *E. eugenoides*, *E. gunnii*, *E. leucoxylon*, *E. obliqua*, *E. piperita*, *E. rudis* and *E. Stuartiana*.

The following are adapted to regions dry and hot during the summer and frosty during the winter: *Eucalyptus corynocalyx*, *E. hemiphloia*, *E. leucoxylon*, *E. microtheca*, *E. polyanthema*, *E. rudis*, *E. tereticornis* and *E. viminalis*.

The following are adapted to cultivation on alkali soils: *Eucalyptus cornuta*, *E. robusta* and *E. rostrata*.

The eucalypts which are growing and fruiting at the present time in the United States serve the following uses: Forest cover, windbreaks, shade, fuel, posts, railway ties and other underground purposes, piles, street paving, telegraph poles, shipbuilding, vehicle making, agricultural implements, furniture and cabinet-making, etc.

The following species, growing in the United States, are useful as a source of either oil, kino or honey: (*a*) As a source of oil: *E. amygdalina*, *E. eugenoides*, *E. globulus* and *E rudis*. (*b*) As a source of kino: *E. calophylla*, *E. corymbosa*, *E. rostrata*, *E. siderophloia* and *E. sideroxylon*. (*c*) As a source of honey: *E. calophylla*, *E. citriodora*, *E. corynocalyx*, *E. hemiphloia*, *E. leucoxylon*, *E. longifolia*, *E. melliodora*, *E. pilularis*, *E. polyanthema*, *E. rostrata*, *E. rudis*, *E. sideroxylon* and *E. tereticornis*.

A SYMPOSIUM ON THE MEANING OF THE TERMS PHARMACOLOGY, PHARMACOGNOSY, MATERIA MEDICA AND RELATED TERMS.

(*Continued from p. 145.*)

Owing to the recent developments in the study of pharmacology, and also owing to the confusion which seems to exist in the minds of a good many people in regard to the meaning of this and other terms, applied in the study of drugs and medicines, it occurred to the editor of this JOURNAL that it would be interesting and profitable to have these terms defined according to their modern acceptation and uses; and with this end in view letters have been sent to a number of physicians, and professors in these branches, in various parts of the country. The first installment of replies was published in our March issue and the remainder follow in the order of the dates on which they were written or received:

Mr. Henry Kraemer, Editor of the AMERICAN JOURNAL OF PHARMACY:

The definitions which I have adopted in my Therapeutics and Materia Medica for the words Pharmacology, Pharmacognosy and Materia Medica follow closely the etymology of those terms and agree generally with the definitions given in the Standard Dictionary. The Greek word Pharmacon is acknowledged to mean a drug or medicine. Pharmacopœia literally means "I make medicines," *i. e.*, give the directions for preparing and compounding medicines.

Pharmacology can only be the science of drugs. In its broadest application it includes everything relating to drugs, their preparations and their effects, both upon the human body and the lower animals. Some of its departments are Medical Botany, Ecology, Pharmacognosy, Pharmacy, Pharmacodynamics. In the last, Therapeutics may be included to the extent that it refers to the employment of drugs in the prevention or treatment of diseases.

Materia Medica comprises what a physician should know about the remedies in repute for the treatment of diseases. It is an elastic term and may be extended so as to correspond with Pharmacology, or, on the other hand, limited to the articles in the Pharmacopœia. Pharmacognosy is the knowledge of the qualities of unprepared medicines. It may also be defined as the science of poisons, but it should not be so used. Pharmacodynamics studies the physiological action of drugs. Very truly yours,

JOHN V. SHOEMAKER.

1519 WALNUT STREET, February 4, 1904.

Dear Dr. Kraemer:

I scarcely know how to answer your query as to the meaning of Pharmacology, etc., and, to tell the truth, have little taste for these discussions. Pharmacology I have always used to indicate the study of the effects of drugs or reactions observed between chemical agents and living matter, without reference to the purpose for which they are used. It thus includes the action of drugs and poisons on plants and animals, whether normal or diseased, and whether applied to injure or kill (poisons) or to heal (drugs). One branch of it, embraced under *therapeutics*, deals with the effects in disease; another, *toxicology*, with the effects of poisonous doses. Pharmacology takes, to my mind, no cognizance of the origin of the chemical agent nor, in fact, of its chemical nature. Materia Medica—a much older term—

indicates the study of drugs before the modern experimental methods were introduced, and may still be used to include knowledge of the type then extant, such as the origin and chemical nature of drugs, their more striking effects and their method of preparation and dosage. Much of this knowledge is, however, now denoted under Pharmacognosy, and, in fact, the old term Materia Medica may be regarded as becoming superfluous, that side of it which looked towards the chemical side being known as pharmacognosy, while the effects on living matter, which were in later years included under Materia Medica, may now be placed under Pharmacology.

There is, as you say, much confusion in regard to the use of the terms. I think that in the history of the word, pharmacology was first used in the same sense as pharmacognosy at present. Pharmacognosy is, I fancy, a comparatively recent term.

If your symposium tends to define the meaning of these terms, it will not have been in vain; but I suppose nothing less than the *fiat* of an academy would suffice to bring order into the present confusion.

Yours sincerely,

ARTHUR R. CUSHNY.

UNIVERSITY OF MICHIGAN, February 6, 1904.

My dear Professor Kraemer:

The composite nature of our language often accounts for what seems to be flagrant irregularities in the meanings assigned to words. As a consequence it is impossible for many English words, such as are constructed out of one or more foreign equivalents, each possessing several shades of meaning, to dispossess themselves of their original genetic dualism or polyism. Of course, there are many Latin and Greek words that carry only a single thought or conception, and correctly preserve this unicism when transferred, somewhat changed, as a correlative in English. Thus when the Latins wished to convey the simple idea of *wood*, the connection, as sometimes in English, alone determined which specific word should be employed—*lignum*, *materia*, *silva*, *nemus*, *lucus*, *saltus*—as each was accepted to be used differently and under no condition interchangeably. There are, however, so many of our foreign derivatives possessing a dual significance that, as a people, we are not slow in accepting such possibilities, or better advantages, wherever they happen to occur. Even in translations, irrespective of source, we

all have noticed another cause for dualism—the great difference between the literal and liberal rendition, for it is this that ofttimes, through a process of evolution, creates a general significance out of the specific. So when we come to consider these three terms: materia medica, pharmacology, and pharmacognosy—we should not lose sight of the prior condition of service in the mother tongue of the component units or words.

(1) MATERIA MEDICA.—Here we have two Latin simples; the former (*materia, æ*), a singular, feminine noun, signifying liberally—matter, material, stuff, of which anything is composed, in the very widest sense; the latter (*medica, us, a, um,*), an adjective with feminine, singular termination, in agreement with materia, signifying literally—medical, curative, of or belonging to healing. The term, therefore, means, medical matter, medical material, medical stuff, and, although written in the singular, the word materia implies collectiveness, plurality; hence, curative remedies, agents, be these what they may. In pursuance of this idea we refer constantly to the matter or material of the universe, including without question, at least, all that is unorganized, and possibly equally well the organized. Liberally, the term is accepted as including everything employed to palliate physical suffering, and the scientific treatment of such agents is reduced to a science bearing the name. "Medical material" is certainly very comprehensive, and a work titled "Materia Medica" is absolutely without restriction as to quantity and quality of its contents, so long as all included substances are believed to possess curative power. Heat, cold, light, darkness, electricity, galvanism, massage, hydropathy, simple mechanical appliances are all within its scope, just as much so as the more important organic and inorganic drugs. There is no doubt but that in the earlier days of medicine, when the term "materia medica" was selected, it was intended to include all curative agents as well as all important knowledge pertaining thereto. But drugs at that time, be it remembered, were by no means so well understood as at present, inasmuch as their treatises then were restricted chiefly to the source, physical description of the crude parts (botanically, chemically, etc.), doses, acceptable preparations, method of manufacture, etc., having little or nothing to say concerning the applicacion of drugs to the well or sick organism. The original science consequently occupied a somewhat limited field compared with that

of to-day, from the fact that as science in general became more popular, the progressive medical minds desired to know the whys and wherefores of results obtained through medicines. This laudable ambition opened the way to an endless amount of experimentation, which has resulted in the ultra scientific individual preferring to draw a line between the primitive conception, *descriptive*, and the more modern, *applied*, and to each assign distinctive names—to the former materia medica, or pure materia medica; to the latter, pharmacology and therapeutics.

(2) PHARMACOLOGY, Gr. *φάρμακον* (pharmocon) + λόγος (logos), λογια (logia)—pharmaco(n)log(-ia)y. Here again we have two foreign simples contributing to form our term, each carrying several meanings; the former (*φάρμακον*) signifies literally—any artificial means for producing physical effects, which again is very comprehensive, but the Greeks shaded this conception by assigning to it a more restrictive meaning—a medicine, drug, remedy; thus Æschylus wrote: *φάρμακον νόσου*, a medicine for sickness; the latter word (λόγος) is equally sweeping, for natives employed it so universally—sometimes to mean a word, or words, a saying, speaking, language, talk, statement, dialogue, conversation, discussion, discourse, history, account, consideration, etc. Consequently it is evident, should we so desire, there is nothing etymologically that could prevent the employment of the word pharmacology with the broadest latitude—as a true synonym or companion term to materia medica, and in this sense it is accepted very often.

When about the middle of the last century some of the leading scientists, especially in Germany, took up experimental vivisection, and the application of drugs to the living animal, man included, the word pharmacology was coined, and ever since in that country it has maintained this restricted signification—the science of remedies, other than foods: how these when administered, in fine subdivision, act and produce changes in the living organism; the explanation of the symptoms created in health or sickness by substances detrimental or useful; how drugs effect our organs, tissues, fluids, secretions, etc., thereby accomplishing work. Thus it would seem to deal with *invisible theories*, while materia medica with *visible materials*, and thereby becomes but another name for the physiological action of drugs and their constituents in health and sickness. This field is so comprehensive, important and different from the older

materia medica, that it possibly deserved a specific name, and the one selected answers admirably, provided by common consent it can so be understood and observed universally.

(3) Pharmacognosy, Gr. φάρμακον (pharmacon) + γνῶσις, γνωσή (gnosis, gnoso)—pharmaco(n)gnosy. Here, as in the two preceding cases, we have two foreign simples combined to form our English term; the former (φάρμακον) has already been explained under pharmacology; the latter (γνῶσις, γνωσή), as with λόγος, is very far reaching, it actively being equivalent to—a knowledge, an inquiry, knowledge of a higher order, deeper wisdom, acquaintance, knowing, recognizing. Again here, so far as etymology is concerned, there is no restriction of scope to which the term may apply, and yet it was instituted for conveying the idea of a masterly study of the drugs, but along a restrictive or special line, and for this, as seen above, the original roots give abundant license in the one shade of meaning, *recognizing*, *i. e.*, one drug from another by physical and chemical characters, which may be interpreted liberally as comprising the knowledge of selecting and identifying true and false specimens by such characteristics. Consequently this is the descriptive side of materia medica (science of describing drugs physically) as pharmacology is the experimental side—science of the action of drugs.

Conclusions:

(1) Materia Medica.—The older name for a treatise on curative agents, and although originally intended to be all comprehensive, is employed often at present in a restrictive sense—simply to a general consideration of the materials in all respects, save that of application—physiological action and therapy.

(2) Pharmacology.—Although literally a synonym of materia medica in its broadest sense, yet was intended originally to represent the experimental side of the subject—the application of agents to the system; how they act upon the healthy and sickly organisms, thereby revealing their possible value in curing disease.

(3) Pharmacognosy.—Although a term equally comprehensive as the two preceding, yet it was created to represent the descriptive side of materia medica, so far as it may apply to describing, physically and chemically, the animal and vegetable crude drugs, disclosing thus by comparison the many distinguishing characteristics.

While the employment of these three terms in a liberal sense,

seems equally permissible, yet the exercise of this inherent quality has led to so much confusion that it would be far better to accept each in an independent spirit, or restrictively, as was intended, and now is preferred by many. Such, however, can only result through common consent and usage of the scientific workers, and these as a class seem almost as disinclined at present as in the past to use their best efforts towards harmony and uniformity.

DAVID M. R. CULBRETH, M.D.

1307 N. CALVERT STREET, BALTIMORE, February 11, 1904.

To the Editor of the AMERICAN JOURNAL OF PHARMACY:

When, twenty years ago, I first began critically to study definitions for my work, I observed the diversity even then existing in the meaning of the terms descriptive of the various medical sciences.

I then accepted the definitions as laid down by Dr. Hermann Hager in "Erster Unterricht des Pharmaceuten," and have never seen the necessity of materially changing my conception of his views of the subject. Hager, to my mind, was the world's greatest pharmaceutical author ("Schriftsteller" is more expressive), because he went to the root of every subject, and could therefore always be relied on, besides etymology was his especial fort.

Accordingly, pharmacology means literally the science of drugs —the very broadest term that could be conceived, since it comprises everything that pertains to the composite—"medicine"—except psychic and mechanic agents and influences, or the "immateria medica" of the present age, also known as the "non"-pharmaco-therapy, or the treatment of disease without drugs, from massage and electricity to climatology and "christian science" (?).

Since the confusion as to the meaning of the term pharmacology has arisen through the application of the term to describe experimental pharmacodynamics—the action of drugs on the living organisms in the normal state or health—by chiefly all English-speaking writers, it may be well to first consider some foreign authorities.

Of English authorities, Brunton appears to define pharmacology "as that division of materia medica which treats of the action of drugs on the living body."

Of French authorities, the great work of Littré, "Dictionnaire de Medicine, Chirurgie et Pharmacie" (Bailliere), says: "Materia medica is that part of pharmacology which treats of the origin, char-

acter and composition of medicinal substances; pharmacology comprising, in addition to this, also therapeutics."

Of German authorities, Theo. Husemann (Göttingen) "Gesammte Arzneimittellehre" makes the following classification:

PHARMACOLOGY—ARZNEIMITTELLEHRE.

(1) Pharmacognosy—Drogenwaaren Kunde.
(2) Pharmaceutical chemistry.
(3) Pharmacodynamics—action on normal organism.
(4) Therapy—action on abnormal organism.
(5) Compounding—Recepture-Kunst.
(6) Dosage—posology.

From these considerations, I would formulate the definitions as follows:

Pharmacology—the science of medicinal agents—material or ponderable.

Comprising these divisions:

Materia Medica.	Organic.	Inorganic.
Derivation.	Pharmacognosy.	Chemistry.
Character.	{ Physics.	"
Properties.	{ Chemistry.,	"

Pharmacodynamics—toxicology, action and force of substances on living organism in normal state—health.

Therapeutics—action on abnormal living organism in disease; also comprises "immateria medica."

Pharmacy—preparation and compounding; really comprises all but pharmacodynamics; incidentally, therapeutics, to "serve" better "forms" of pharmaceutic agents.

I am especially interested in the effort to secure an intelligent understanding of these terms, since if the proposed definition of pharmacology were generally accepted, it could advantageously supersede the present unwieldy title of the Section on Materia Medica, Pharmacy and Therapeutics of the American Medical Association. Fraternally,

CARL S. N. HALLBERG, PH.G., M.D.

CHICAGO, ILL., February 16, 1904.

Dear Professor Kraemer:

I have had it in mind to comply with a request received from you some time ago for my understanding of certain words. What I

have jotted down now may be of no value, and may not accord with the ideas of others altogether.

PHARMACY.—(1) The art of preparing and compounding drugs for use as medicines. (2) The occupation of an apothecary. (3) The place of business of an apothecary.

The use of the word in the third of these senses is recent, and should be discountenanced.

PHARMACOLOGY.—That branch of science which relates to drugs, including their origin or source, the history of their medicinal use, their recognition in the several pharmacopœias, etc. Some recent writers have used the word in a restricted sense as the science of the action of medicines, which is properly called pharmacodynamics. In the larger meaning the word, no doubt, according to its etymology, might include both pharmacodynamics and pharmacognosy. It is better, in my judgment, to confine the use of the word to the range indicated in the above definition. This, I think, is in accordance with common usage.

PHARMACOGNOSY.—That knowledge of drugs which may be described as a practical acquaintance with them as objective things.

MATERIA MEDICA.—In its original and restricted sense, simply an enumeration of those articles employed as medicines, or as remedial agents. The term is, however, very commonly used in these days as a general one, including everything that belongs to a knowledge of drugs, so that pharmacology, pharmacognosy and pharmacodynamics are but branches of "Materia Medica." Such a use of the term is, however, not in accordance with etymology, and a purist would incline to make pharmacology the general word.

I have not consulted dictionaries in the foregoing definitions, but endeavored to state what seems to me to be the accepted and approved usage in literature.

Very truly yours,

A. B. LYONS.

DETROIT, MICH., March 4, 1904.

COLLEGE OF PHARMACY OF THE CITY OF NEW YORK.

The affiliation of the College of Pharmacy of the City of New York, on the seventy-fifth anniversary of the College, with Columbia University, on the same basis as Barnard College and Teachers

College, is a matter of more than passing moment. We are indebted to Mr. O. J. Griffin, assistant secretary of the College, for a typewritten account from stenographer's notes of the annual meeting of the College, held on March 15th, when the ratification of the union was effected.

Prof. Charles F. Chandler, who is president of the College, was unable to be present on account of illness, and in taking the chair, Vice-President Schieffelin said: "I regret exceedingly that President Chandler is ill in bed. He was taken with the grip to-day, but got up and dressed this evening, intending to come to this meeting, but they positively had to prevent his coming out." He then said: "The principal business before us to-night is to act upon the report of the special committee appointed by the Trustees to confer with the authorities of Columbia University. I have the honor to be chairman of that committee; but before presenting the report, I will read Dr. Chandler's letter, which most of you have received, but which is important enough to read again. The letter was as follows:

"The suggestion that this consolidation should take place came from the authorities of Columbia. The true significance of that should cause a great deal of gratification to every member of the College of Pharmacy, because it is undoubtedly an evidence that those gentlemen conisdered our College to be of the first rank. We have known this ourselves; but to the public it has been regarded as a college supported by the druggists and organized by the druggists, and to a certain extent a trade college. Why it hardly seemed to many of us ten or fifteen years ago, within the range of possibility to become a part of the University, although when I was abroad in Munich and saw the students studying pharmacy, the regularly matriculated students of the University of Munich, which was then the second university in Germany, it occurred to me then how unfortunate I had been in not being able to study pharmacy at Columbia, as I had been able to study chemistry, and I thought that in the not far distant future the chemist and the pharmacist would have the great advantage of the entire University training. This advantage is now within our reach.

"I want to point out to you that all the members of the College, that all the students and graduates, the Trustees, the ex-President and the President, and above all, the Faculty of the College, are the ones who are responsible for this move. I may say that

from the very beginning they have striven for the very highest standard of honorable scholarship in pharmacy—they have always striven to raise the standard. The Philadelphia College and the New York College have taken the very first rank in pharmaceutical education in this country, and it is to our credit, for we may say it, and to our honor, that Columbia University has recognized this fact. We can be very sure that no such suggestion, no such invitation, would have come from them if they had not investigated and recognized the quality of instruction and the high standard held by this College."

After pointing out some of the advantages which the students of the College would enjoy as undergraduates of Columbia, the Chairman said: "The negotiations have been rather protracted, because there were a great many minor points to be adjusted. It seemed at first glance that it would not be possible because our standard of admission was not the same as for admission to Columbia, and because the courses and diploma were not the same. But your committee has had many conferences and many meetings. The men whom you must thank for bringing it to a successful close, the ones who have given it the greatest time and advice, are President Chandler, Secretary Main, Treasurer Bigelow and Professor Rusby, of the Faculty. They have been constant in furthering these negotiations and in giving of their time and their experience to help."

Thomas F. Main, Secretary of the College, was then asked to read the agreement proposed, which was as follows:

This Agreement, made the day of , one thousand nine hundred , between

The Trustees of Columbia College in the City of New York, and the College of Pharmacy of the City of New York (hereinafter referred to respectively as "Columbia University," or "the University," and "The College of Pharmacy"), Witnesseth:

For the purpose of securing to the students of the above-named University and College reciprocal advantages and opportunities, and especially for the purpose of including the College of Pharmacy as a professional school for pharmacists and pharmaceutical chemists in the educational system of the University, it is mutually covenanted and agreed:

(1) That the President of the University shall be, *ex officio*, President of the College of Pharmacy. He shall preside at the meetings of the Faculty of the College and shall have general supervision and direction of the educational administration of such College as in the other schools of the University.

(2) That the internal administration of the College of Pharmacy shall be

conducted by a Dean, who shall be appointed by the Trustees of the College of Pharmacy on the nomination of the President of the University.

(3) That the College of Pharmacy shall be represented in the University Council of Columbia University by its Dean. Whenever the College shall maintain ten or more professors in its Faculty, it shall be entitled to a representative in the Council, additional to the Dean, who shall be elected by such Faculty.

(4) That representatives of the University Departments of Botany, Chemistry, Physiological Chemistry and Materia Medica, to be designated by the President of the University, shall be members, *ex officiis*, of the Faculty of the College of Pharmacy. Such representatives of University departments shall have no right to vote for the representative of the Faculty of the College of Pharmacy in the University Council.

(5) That the University will confer such degrees and diplomas upon students and graduates of the College of Pharmacy as may from time to time be authorized by the Trustees of the College of Pharmacy and approved by the University Council, provided that so long as this agreement is in force the College of Pharmacy shall grant no degrees or diplomas except such as may be approved by the University Council.

(6) That the College of Pharmacy shall continue to exercise the direction and control of all instruction given therein, and the right to grant such certificates to students not candidates for a degree or diploma as may be determined by the Faculty of the College of Pharmacy with the approval of the University Council; and shall exercise all other corporate rights and powers which are not delegated to the University by this agreement; but this agreement shall not be deemed a surrender by the College of Pharmacy of any powers conferred upon it by charter.

(7) That the College of Pharmacy shall retain its separate corporate organization, and that the Trustees of the College of Pharmacy shall continue to provide for the financial support thereof, it being distinctly understood and agreed that the University is, and shall be, under no implied obligation, responsibility or liability of any kind whatsoever for the maintenance, support, direction or management of the College of Pharmacy or for the disbursement of the income thereof; but that all and every such obligation or liability shall be strictly limited to the duties and obligations hereinbefore expressly and in terms assumed and agreed to by the University.

(8) That the courses of instruction given in either the University or the College of Pharmacy shall be open, subject to the general regulations of each institution, to every qualified student who has duly matriculated in either the University or the College of Pharmacy.

(9) That, for each student of the University pursuing courses in the College of Pharmacy, the University shall pay the College of Pharmacy at a rate to be agreed upon from time to time. For each student of the College of Pharmacy pursuing elective courses in the University, the College shall pay to the University at a rate to be agreed upon from time to time. No payment shall be called for from one to the other on account of students or instructors receiving instruction as Fellows or Scholars, or otherwise without payment of fees for tuition either in the University or the College of Pharmacy.

(10) That the Libraries of the University and of the College of Pharmacy

shall be open, upon equal terms, to all students of the University and of the College.

(11) That the Superintendent of Buildings and Grounds, the Librarian, and the Registrar of the University, or the persons performing the duties now attached to these offices, shall be, respectively, Superintendent of Buildings and Grounds, the Librarian, and the Registrar of the College of Pharmacy.

(12) This agreement shall take effect July 1, 1904.

(13) This agreement may be modified at any time by mutual consent expressed in writing, and may be terminated at the end of any academic year, and after one year's notice in writing, from either party to the other.

Mr. Samuel W. Fairchild, an ex-President of the College, moved the adoption of the report of the committee and of the Board of Trustees, and the ratification of the same, which motion was seconded by Mr. McIntyre.

The chairman then called upon members of the committee to explain certain things in regard to the agreement, and Mr. Bigelow, Treasurer of the College, spoke as follows:

"Mr. Chairman, after listening to the reading of this proposed plan of merger with Columbia University, it must be apparent to every member of this College who has read this agreement or who has listened to the reading of it, that we are in no wise surrendering our College wholly to Columbia University. We are not giving up a great deal. On the other hand, the advantages that will accrue to this College from its union with Columbia are very great. It is now some ten years since the subject was first discussed, but the interest at that time did not seem very great on either side. Columbia was then at its old quarters on Madison Avenue, and aside from the union with the College of Physicians and Surgeons, no other separate teaching institution had been incorporated with it, with the College as it was at that time. Since the University has moved to its new location at 116th Street, it has planned to take in a number of other Colleges. The Teachers College was the first, I believe, then Barnard College, and I think we should feel highly flattered that we are the third institution to be invited to join that great University. At the meeting of our committee with President Butler, of Columbia, he informed us that it was proposed that the University take in a large number of Colleges in this vicinity, on the same basis as the invitation to this College to join Columbia. This College occupies a very unique position as an independent College. It has never had an endowment of any kind, and still is self-sustaining, and for the past five years has had a surplus in its

treasury at the end of each year, and has paid off some of the mortgage on its building. These facts, of course, were known to President Butler when he made overtures to this College to join Columbia, and the curriculum of this College was fully looked into, and it appeared to the faculty and trustees of Columbia that it would be better to invite a College of Pharmacy of the standing of this College to join the University, rather than to set up a separate department for instruction in pharmacy, which it became apparent to the trustees of Columbia in the near future would be necessary. Many of the details in regard to the curriculum have not as yet been worked out, but the business end of the plan has been gone into thoroughly, and the trustees of the College feel assured that it will work well in the future. We do not relinquish supervision of our funds, neither do we relinquish any of our present rights. The Librarian of Columbia will have charge of our library; the Custodian of Buildings of Columbia will have charge of our building, supervision over it, and make certain recommendations in regard to carrying on the work of the College from a business point of view. It is now some five or six months since this plan was presented to the trustees, and so far as I know, and so far as I can learn from other members, not a dissenting voice has been raised against this proposed plan, and we come before you to-night and present it, with the hope that it will receive the unanimous support of every member of the College."

Professor Rusby then spoke on behalf of the Faculty, in favor of the proposed agreement.

Vice-President Schieffelin said: "I want to announce that a few days ago the trustees of the University of Columbia approved this agreement as it is here printed, I believe unanimously."

Mr. Ewen McIntyre, ex-President of the College, spoke as follows: "Gentlemen:—I hardly think it is necessary for me to add anything to what has already been stated here as to the good that will come to us from the proposition now before us. I think that when Dr. Rusby gets to be about my age he will not tell the same story about the old fellows that he tells now; and he will arrive there if he lives long enough. I have seen great changes since I graduated at this College some fifty-seven years ago. I knew every one of the original incorporators of the institution; all passed away, the last one only some three years ago—George N. Lawrence. And what is more

remarkable, I have lived to see the fourth generation of one of our drug houses presiding here at our meeting to-night. (Applause.) It is a remarkable coincidence. It is not many who live to see that sort of thing. It gives me very great pleasure to be here to-night, and I am sure that every one of us will see our way clear to accept this proposition. I had a very warm letter from Dr. Chandler on Saturday requesting that I would make a great effort to be here. He little thought then that I would be here and he would not. That I regret his absence it is not necessary for me to say."

Dr. Elliott also spoke in favor of the proposed agreement, and Mr. Main suggested that a rising vote be taken.

The chair then put the question, and requested all in favor of accepting the proposed agreement between the Trustees of Columbia College, in the city of New York, and the College of Pharmacy, of the city of New York, to signify the fact by rising.

The Secretary counted the vote, and announced seventy-nine in favor of the proposition.

The chair then requested any voting in the negative to rise, and, there being none, announced the vote as unanimous.

The chair then announced the customary recess of five minutes previous to the election of officers.

The following officers were elected: President, Nicholas Murray Butler; First Vice-President, Charles F. Chandler; Second Vice-President, Wm. Jay Schieffelin; Third Vice-President, Herbert D. Robbins; Treasurer, Clarence O. Bigelow; Secretary, Thomas F. Main; Assistant Secretary, O. J. Griffin; Trustees, Messrs. Amend, Goldmann, Knapp, White and Henning.

After the ratification of the agreement of consolidation between the two institutions, the chairman of the Drug Trade Section of the Board of Trade and Transportation said that "the manufacturers and the jobbers of your city are interested in your progress, and stand ready to render what assistance they may in the maintenance and perpetuation of an institution so necessary for the welfare of mankind, and one in which there is centered so much of local pride. I believe this to be a long stride forward in the bettering and raising of the standard of pharmaceutical education."

Mr. Felix Hirseman, on behalf of the German Apothecaries' Society, said: "The retail pharmacists of this city in local associations, and also in conventions in the State of New York for the last

five years, have looked with favor to an advancement in the study of pharmacy, and to-day there is pending in the Legislature of this State a bill providing that education shall be necessary before a student can matriculate in any college of pharmacy in the State of New York. There is little doubt in my mind that that bill will finally become a law, and will demand a higher education to become a matriculant of such a college. I think, ladies and gentlemen, the dawn of a high education in pharmacy is at hand, for which the ambitions of the members of this college have been striving for years."

Among other things, Dr. Wm. C. Alpers said: "We now approach a system where the preliminary requirements of those who wish to enter the College will not be any more a matter of form, but will be strictly enforced. We know under what difficulties all colleges of pharmacy in this country have suffered. We know that pharmacy is not a science of itself, but rather the combination of the study of other sciences, and as these different sciences have made enormous progress during the last two or three decades, we know the leaders in the colleges of pharmacy have been compelled in order to keep pace with the advancement of these sciences, to pile one new study after another on the curriculum, which ten or twenty years ago was even then too difficult for the material that was at our disposal. We know what a vast difference exists between the preliminary requirements of the colleges of pharmacy in this country and similar institutions in Europe. The high requirements there enforced are not the result of despotism or the desire of selfish exclusiveness, for these colleges are just as anxious to get students as we are. But these high requirements are absolutely necessary and were forced upon the leaders of the old universities as the result of experiments for a century."

Charles S. Erb, on behalf of the Alumni Association, said: "In order to show the appreciation of the Alumni Association for this College, they have thought it wise to give some tangible token of their love for the College, and on this seventy-fifth anniversary they donate to the College the sum of $2,000. In this connection I may state that about $500 of this sum has been given by the professors of the College, $500 by the Association itself, and the other thousand has been contributed by several members."

President Nicholas Murray Butler, of Columbia, was not present, having gone to Mexico.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

First Course in Microchemical Analysis. By Carl Gustav Hinrichs. With atlas. St. Louis, Mo., 1904. New York and Leipzig: Lemcke and Buechner.

About a year ago Prof. Gustav D. Hinrichs, the well-known author on atomic weights and general chemistry, requested his son to work out a course in microchemical analysis which should not require the use of sulphuretted hydrogen, intending to use it in connection with a work on microchemical analysis which he had contemplated publishing. Upon the completion of the work by his son, the elder Hinrichs insisted that his son's name appear as author, he writing an introduction to crystallographic chemistry.

Microchemical analysis is defined as the chemical identification of minimal amounts of substance in concentrated solutions. The amount of substance used in such analysis is very small, usually a tenth of a milligramme giving sharp and positive results.

While it is known to a certain extent that the crystalline form of a substance is an extremely important physical property in its identification, yet chemists have not generally confirmed their results by microscopic examinations of chemicals or precipitates. This work by Hinrichs will draw attention again to this important subject.

Considerable work has already been accomplished along this line, there being at least one rather comprehensive German work on the subject. The plates reproduced from the works of Behrens, Haushofer, Lehman, and others, as well as the original drawings of the author, are of considerable assistance in connection with the text. In the present work the author has considered the substances usually considered in a complete course of qualitative analysis.

Another work covering Dr. Hinrichs's researches on complex compounds and mixtures, as well as organic compounds, is in preparation.

The introduction to crystallographic chemistry, by Dr. Gustav D. Hinrichs, is particularly valuable and unusually clear.

We commend the present work for its originality and usefulness, to chemists and pharmacists, and all interested in microchemical analysis.

PHARMACEUTICAL MEETING.

The sixth of the pharmaceutical meetings of the Philadelphia College of Pharmacy of the series for 1903–04 was held on Tuesday, March 15th, at 3 o'clock. Mr. William L. Cliffe, a member of the Board of Trustees, presided.

The first paper on the programme was by Prof. Wilbur L. Scoville, of the Massachusetts College of Pharmacy, on "Aromatic Elixir," which was accompanied by specimens, and was read in the absence of the author by Mr. Warren H. Poley. (See page 158). In discussing the paper, E. M. Boring remarked that he followed the method recommended by Professor Scoville of separating the yellow, oily layer of the rind by paring it off with a shoemaker's knife. The observation that the addition of alcohol either to the orange and lemon peels or to the oils masked the odor, was commented upon by Messrs. Poley, Boring, Cliffe and Remington. Professor Remington said that perfumers had long known that alcohol was a perfect solvent for volatile oils, holding the constituents very closely, and that dissociation was effected upon the addition of water to the alcoholic solution, thus developing the odor. Charles Leedom stated that he preferred to use solutions of good volatile oils.

Professor Remington said that owing to the fact that it was almost impossible to obtain volatile oils of orange and lemon that could be depended upon, it was proposed to introduce into the next Pharmacopœia a process for making spirits of orange and lemon directly from the peel, and that the preparations thus made kept many times better than spirits made from the volatile oils. He furthermore said that he doubted if muscatel wine would be introduced into the Pharmacopœia.

The question was raised by Professor Remington as to how the pharmacists of the country would receive the change proposed by Professor Scoville, and whether they would take the trouble to get oranges and lemons for the preparation of the tinctures.

Mr. Boring said that it would depend upon the individual, that the man who was interested in his profession would use the improved formula. Mr. Poley said it would depend upon whether the formula was an actual improvement, and cited the efficiency of the old formula for syrup of tolu as compared to that which is official at the present time. In regard to this point, Professor Remington said

that the old formulas for both syrup of tolu and syrup of ginger would be restored.

Dr. Carl Frese, L.S.A., of Philadelphia, presented a paper, entitled "A Physician's Experience with Pharmacists." The paper gave rise to an animated discussion, which was participated in by Messrs. Warren H. Poley, E. M. Boring, Wm. McIntyre, C. B. Lowe, Joseph P. Remington, M. I. Wilbert, Wm. A. Lee, John Burg, Charles Leedom and the chairman. Like in all discussions of this kind, it was shown that the better the understanding between physicians and pharmacists the better it is for both professions, and that in both professions there are men who do not live up to the code of ethics of their respective callings. Owing to the importance of this subject, not only in its relation to the two professions, but as it concerns the public at large, it will be further considered at a later meeting.

Mr. McIntyre said he thought that physicians who use the metric system should use the line rather than the point for separating the decimal quantities.

Mr. Wilbert called attention to the difference existing between the practice of pharmacy in hospitals in Philadelphia and the same in the hospitals in Europe, particularly in Paris, where, of the fifty-seven active members of the Paris Society of Pharmacy, twenty-two are hospital pharmacists, and many of them leaders in their profession and well-known scientific men.

Harold B. Morgan, P.D., read a short paper describing a universal percolating stand which he had devised, and exhibited a stand in connection therewith. The stand is capable of an operation requiring any size of percolator up to 3 gallons, and any size of receiver up to a 5-gallon demijohn. Professor Remington said the idea was a good one, providing one had plenty of room. He said there was no disadvantage in the iron ring if sections of rubber tubing are placed at several places on the ring, as originally suggested by Dr. Squibb.

He further remarked that by use of an iron rod, six percolators could be used at a time, and said that with a revolving stand, like a castor or book-case, its usefulness would be increased. Mr. W. C. Wescott said that he used a method suggested to him by Mr. Wilbert and employed by him at the German Hospital, namely, of using iron rods suspended from joists in the ceiling.

M. I. Wilbert, Ph.M., presented some notes from Joseph Ince's book on "Elementary Dispensing" (see page 171).

Wm. McIntyre exhibited a collection of price-lists of forty years ago, and said:

"The object of the committee in having this subject brought to the meeting is largely the historic side, and while I can show some lists of the period, you will find the exhibit contains names of firms still in business, and many others who have been part of the drug, chemical and allied industries of our city.

"With such a large and representative meeting of druggists I will take occasion to distribute some pictures of members of the American Pharmaceutical Association, with a short account of the meeting held at Washington in 1884, my object being to invite all who are not now members, to become such, and meet with them this year at Kansas City and St. Louis.

"To-day I will give a short history of one of the leading chemical concerns—Rosengarten & Sons. My reason for which is, I have been in the business forty years on an uptown street, which in my early life was distinguished by having at one end Carl Zeitler and at the other J. W. Farr, names somehow intertwined with chemical history.

"Much of interest can be developed from reading a few orders, bills and letters. While they show that but little was spent with the printer, they contain names of strong men who have left with us results of their energy.

"In 1824 bottles were bought at T. W. Dyatt's factory, Aramingo Creek and Delaware River. 1834, Al. E. Roberts sold quicksilver at 56 cents, and saltpetre at 9½ cents. 1836, Lennig & Co. sold opium at $4.12½. 1837, John Henshaw bartered 100 pounds of opium at $4.25 for morphine at $4.50 per ounce; the letters show that 'bark' came by sloop from Baltimore. A sale made to W. L. Krumbhaar of sulphate and acetate of morphine in drachm bottles—put up in French style—illustrates, even at that day, some of the difficulties of introducing American-made goods under correct labels.

"In closing, I call attention to a series of price-lists illustrating the growth of the firm of Keasby & Mattison. With this many of us are familiar, even some having been students under Dr. Mattison's care. Both members of this firm are graduates of this College, and, no doubt the chemistry learned here was the corner-stone of their success. To illustrate what I have in my mind, carbonate of mag-

nesia is soluble in carbonic acid water and insoluble in water. How much has the utilization of these facts to do with the extensive chemical plant at Ambler?"

Professor Kraemer called attention to the following specimens: Three sets of cocoa in its various stages from the bean to the powder, showing the shells, cocoa butter, etc., which were received from the Croft & Allen Company, of this city, and which he intended to distribute in the several departments of the College; samples of thirteen crude drugs which were grown by the U. S. Department of Agriculture, in connection with drug-plant investigations.

Thos. S. Wiegand exhibited a portable assay balance in a metal case—intended especially for the use of assayers when traveling through the mining regions—made by Henry Troemner. The entire case with contents weighs but 19½ ounces; measures 7 inches in height, 4¾ inches in breadth and 2 inches in depth. It is sensitive to the $\frac{1}{50}$ of a milligramme. The case is provided with set screws, so as to make it set level. The firm have just received an order from the Chinese Mint for a bullion balance capable of weighing 10,000 ounces of silver at a draft, and is to be sensitive to $\frac{1}{100}$ of an ounce when carrying the load of 20,000 ounces. They also received an order for eighteen adjusting balances for the same establishment.

A vote of thanks was tendered the several speakers and those who sent specimens.

The following provisional programme has been arranged for the next meeting, on April 19th:

"A Pharmacist's Impression of the Orient," by E. Ross.

"Notes on Italian Olive Oil," by A. Angusto.

"The Manufacture and Commerce of Honey," by Wm. A. Selzer.

"The Pharmacist and the Pharmacopœia," by M. I. Wilbert.

"A New Prescription File," by John W. Outerbridge.

HENRY KRAEMER, *Secretary.*

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN.—The report of the Registrar of the Society, for 1903 (*Pharmaceutical Journal*, February 6, 1904), contains some figures which are of more than local interest. The total strength of the Society is stated to be as follows: Life compounders, 459; annual subscribers, composed of members and student-associates, 6,188. The number of persons registered as "apprentices or students" is 194. The number of pharmaceutical chemists on the register is 2,141, and of chemists and druggists, 13,436. Four hundred and nine cases of alleged infringement of the Pharmacy Act (1868) were investigated during the year, and proceedings instituted in 151 of these.

THE AMERICAN

JOURNAL OF PHARMACY

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THE PHARMACIST AND THE PHARMACOPŒIA.

By M. I. Wilbert.

Apothecary at the German Hospital, Philadelphia.

A number, if not all, of the American pharmaceutical journals have recently published contributed articles and, in several instances, even editorials, decrying the use of the metric system of weights and measures in the United States Pharmacopœia, and intimating, if not positively asserting, that the introduction of alternative formulas would make the Pharmacopœia more popular with that class of pharmacists that have been, and are, contenting themselves with one or the other of the Dispensatories or other text-books that are allowed to use the text of the Pharmacopœia, in whole or in part, as they see fit.

The writers of these several articles have, however, lost sight of the peculiar conditions existing in American Pharmacy, and have not taken into consideration the history of the origin and development of the several treatises, or so-called commentaries, and their relation to the Pharmacopœia.

In the following pages an effort has been made to trace in outline the history of the more important American dispensatories, and to consider to some extent the effect they have had on the use and popularity of the Pharmacopœia, and on the progress of medicine and pharmacy in general.

In an article, limited as this naturally must be, it will not be possible to review, or even to enumerate, all of these publications, and we will confine ourselves therefore to the enumeration of such as

have played a more or less important part, or form a natural link in the sequence of the series of text- or reference-books that have been in continuous use in this country for upwards of a century.

There appears to be more or less difference of opinion as to the meaning of the words Dispensatory, Commentary and Pharmacopœia, so that it may be well to state what is meant by these several terms, and also to point out the class of books that would properly come within the accepted definition.

The word Dispensatory is properly applied to a book containing an exhaustive but popular account of the physical properties, history and medicinal uses of drugs and preparations, that is intended to be of particular interest and use to physicians and others desiring a more or less exhaustive treatise on the origin, history and use of drugs.

Originally, the word Dispensatory was applied to a translation, with a more or less popular elaboration, of the Latin Pharmacopœias published by the several colleges in England, Scotland and Ireland. As examples of such books, we may mention the Dispensatories by Bates, 1691; Quincy, 1718; James, 1747; Webster, 1786; Duncan, 1788; Rotheram, 1794; and Duncan, Jr., 1800.

A Pharmacopœia is usually understood to be a book of formulas and directions for the preparation, recognition and testing of medicines and medicinal preparations that is published by some generally accepted authority. This authority may or may not be that of the existing government; as examples of the extremes we may mention the German and the United States Pharmacopœias.

A Commentary is understood to comprise a series of comments or annotations in explanation or elucidation of difficult or obscure passages in a book or treatise.

In connection with a Pharmacopœia this term could only be applied to a book the object of which was to explain or to elucidate the directions for making preparations or for applying the several tests that are given in the body of the Pharmacopœia.

For examples of this class of book, we will be obliged to go outside of our own country; the most accessible, probably, are The Pharmacopedia, by White and Humphrey, London, 1901, and The Handkommentar, by Schneider and Süss, Göttingen, 1902. If we review the history of authoritative books in our own country, we find that during the Colonial period, and even up to the first decade of

the nineteenth century, the Dispensatories, based on the several editions of the London or the Edinburgh Pharmacopœias, were practically the only authoritative books used or known.

The Pharmacopœias themselves were only known indirectly, the chief reason being the lack of knowledge of Latin on the part of the early medical practitioners.

The first distinctly American publication was the American Dispensatory, by Dr. Redman Coxe, published in Philadelphia, in 1806. This book, although little more that a reprint of Duncan's Edinburgh Dispensatory, had a large circulation, and was generally accepted as an authoritative work by a large number of American practitioners. The American Dispensatory was republished in nine successive editions, the latest appearing in 1831.

The American New Dispensatory, by Dr. James Thacher, was published in Boston in 1810. While the general arrangement of the contained material was along the same lines as that of the Dispensatories based on the London and Edinburgh Pharmacopœias, and much of the matter was taken from one or the other of these books, this new Dispensatory contained a number of original features. Among others, it will be found that Dr. Thacher was given permission to use the material contained in the Pharmacopœia of the Massachusetts Medical Society, published in 1808, so that this Dispensatory may properly be said to have been the first based on an American Pharmacopœia, and also the first to establish the precedent of quoting, in addition to the American, several of the foreign Pharmacopœias.

The American New Dispensatory was largely used throughout the Eastern States; it appeared in four consecutive editions, the latest in 1821. This last edition, as well as the editions of the American Dispensatory, published between 1820 and 1830, was based on, or quoted, the United States Pharmacopœia of 1820.

As is well known, the first edition of the United States Pharmacopœia was published in Boston in 1820; and while it is true that a second edition of the same book was printed in 1828, the book itself did not receive the support that it rightly deserved either from the medical practitioners or from the pharmacists.

In speaking of this first edition of the United States Pharmacopœia, in his memoirs, Dr. George B. Wood says: "The first Pharmacopœia was issued in 1820; it was creditable as a first attempt, but

was, in many respects, so defective that it failed to command general acceptance. At the end of ten years, which had been fixed on for its revision, it seemed, except in some limited localities, to have been almost forgotten."

It was no doubt due to this general lack of interest, and also to the absence of any due appreciation of the far-reaching possibilities of hasty action, that the delegates from a large section of the country failed to take any interest in either of the conventions that were held in 1830. This lack of general interest, no doubt, led to the publication of two Pharmacopœias for that year.

The Pharmacopœia published by the convention that met in New York preserved many of the inaccuracies and faults of the first Pharmacopœia. Quite an exhaustive review of this book will be found in the second volume of the AMERICAN JOURNAL OF PHARMACY, 1830, page 316.

The convention that assembled in Washington, while not numerous, was composed of earnest and able scholars, and had presented to them a very complete draft, for the revision of the Pharmacopœia, by the delegates of the College of Physicians of Philadelphia. With some slight modifications this draft was accepted and referred for publication to a sub-committee, composed of the members of the delegation from the College of Physicians of Philadelphia: Dr. Thomas Hewson, Dr. George B. Wood and Dr. Franklin Bache, who had also prepared the original draft.

Referring to the precautions that had been taken to avoid mistakes, Dr. George B. Wood says: "Before allowing the book to go to press, so desirous was the committee that it should receive the approval of all who might afterwards be practically concerned, that it was submitted to the scrutiny of the Philadelphia College of Pharmacy, which, after a careful examination by a committee, returned it with their endorsement, making, however, certain valuable suggestions of which the committee was happy to avail itself."

This committee of the Philadelphia College of Pharmacy was composed of Daniel B. Smith, Henry Troth and Dr. Benjamin Ellis.

The Philadelphia Pharmacopœia, as it was sometimes called to distinguish it from the Pharmacopœia published in New York, was published in 1831, and while it met with the approval of a number of physicians and pharmacists, was severely criticised by some individual writers.

Among the latter was Dr. Redman Coxe, who, in his "American Dispensatory," attacked some of the formulas and minor details of the Philadelphia Pharmacopœia quite severely, and appeared to favor the acceptance of the New York Pharmacopœia as the national standard.

This attack was thought to be unwarranted by Dr. George B. Wood, a member of the Philadelphia revision committee, and at that time professor of Materia Medica in the Philadelphia College of Pharmacy. Dr. Wood wrote quite an exhaustive review of the attacks (A. J. P., 1832, page 94), in which he defended the position of the Pharmacopœia and refuted many of the arguments that were used by Dr. Coxe.

It was no doubt largely due to this attack on the Pharmacopœia, in the leading Dispensatory of that time, that Drs. Wood and Bache hastened the publication of their own proposed work, the United States Dispensatory.

The motives that actuated the authors of this book, as asserted by Dr. Wood, its originator, were "to make the United States Pharmacopœia more generally known and acceptable, and thereby contribute to its universal practical recognition as the national standard."

"The United States Dispensatory was designed primarily to be a commentary on the Pharmacopœia, giving detailed accounts of the medicines it recognized and explaining and enforcing all its processes."

The general style and make-up of the book was, however, closely patterned after that of the Dispensatories previously published in this country, even so far as to include and comment on the preparations of the London, Edinburgh and Dublin Pharmacopœias. It was largely due to this unfortunate compliance with former precedent that the United States Dispensatory from the very beginning took quite a different position in the shop of the pharmacist from that intended for it by its authors.

This new Dispensatory was eminently successful in a monetary way, the first edition was sold within a year and no less than four editions were printed in the first decade.

The United States Dispensatory was practically without a competitor until 1852, when Dr. John King published his "Eclectic Dispensatory." This name was changed in the second edition to "The American Eclectic Dispensatory," and later to "The American Dispensatory."

That Dr. King, in the first editions of his "Eclectic Dispensatory," followed the general style of the United States Dispensatory rather closely is evident from the reviews (A. J. P., 1854, page 269; also A. J. P., 1859, page 285), and from the fact that Dr. King was proceeded against, in a court of law, by the publishers of the United States Dispensatory, who succeeded in restraining him from selling the first edition as printed.

The general scarcity of text-books on subjects relating to pharmacy and materia medica, in the earlier decades of the last century, coupled with the fact that but few pharmacists had had an opportunity for systematic training in the various branches of the natural sciences, and also, no doubt, the widely prevalent practice of giving an opinion on the efficiency and usefulness of certain household remedies, contributed very materially to make these early editions of the Dispensatories popular with pharmacists. Many, if not the majority of pharmacists, finding that the Dispensatory was based on, and included, what was to them the most essential features of the Pharmacopœia, never felt or appreciated the need or use of the latter book.

That the popularity and use of the Dispensatories has long been considered a menace to the progress of pharmacy along scientific lines is evident from the written opinions of a number of the earlier leaders of the pharmaceutical profession.

Prof. William Procter was particularly impressed with the importance of this fact, and as early as 1851 advocated a reduction in the price of the Pharmacopœia with a view of making the current edition of the Pharmacopœia more popular among pharmacists and students. An extract from his review of the, then, newly published Pharmacopœia may not be out of place here, foreshadowing, as it does, the hopes that prompted the articles referred to in the opening paragraphs of this paper:

"We cannot leave the subject without recording our opinion in favor of a cheap duodecimo edition of the Pharmacopœia, so that every apothecary, physician and medical student can have a copy and become familiar with the work. A large majority of the physicians and apothecaries in this country know nothing of our pharmacopœia except as they learn it through the dispensatories, where it is so mixed up with the British Pharmacopœias as to frequently confuse both physician and apothecary." (A. J. P., 1851, page 397.)

It was largely, if not entirely, due to the direct efforts of Professor Procter, in this direction, that the Pharmacopœial Revision Committee published in 1855 the small paper (duodecimo) edition of the Pharmacopœia. It was also due to Professor Procter's personal solicitation that the convention for the revision of the Pharmacopæia, in 1860, fixed the price of the coming Pharmacopœia at the really nominal price of $1.00 a volume. But at even this very low price it could not be said that the Pharmacopœia was really a popular book, or that it was generally used by the retail pharmacist in his routine work.

To the casual observer it would appear that there was quite an improvement in this respect, after the publication of the 1870 revision of the Pharmacopœia, when the new Pharmacopœia was actually to be found on the work table of a large number of retail pharmacists. The true reason for this was not, however, to be found in any intrinsic feature of the Pharmacopœia, but in the fact that the United States Dispensatory had not been held up to the very high standard of excellence that had characterized the previous revisions of that book. In explanation it might be said that Dr. Franklin Bache had died in 1864, and that the remaining author, Dr. George B. Wood, had retired from any active participation in the duties of his profession, and could not be expected to be sufficiently in touch with the advances, in the several lines, to personally supervise so extensive a revision.

That pharmacists had not advanced sufficiently to do without a more extensive treatise on subjects relating to their profession is evident from the ready sale that the first edition of the National Dispensatory (published in 1879) met with.

The first edition of this work, said at the time to have been a very large one, was entirely sold out within ten months of the day of issue, and the book itself was out of print for several months before a second edition could be prepared.

The popularity and sale of the Dispensatories was also greatly favored by several features peculiar to the Pharmacopœia of 1880.

It may be well to review some of these features and the reasons for their introduction, as they are quite as important now as they were then.

For some time prior to the meeting of the Convention, in 1880, it had become the custom of speaking of, or referring to, galenical

preparations as being of a certain per cent. strength; then, too, the desirability or the necessity of introducing additional assay processes for drugs of vegetable origin, and to define certain limitations in terms readily understood, appeared to make it desirable that the preparations be made by some method of weight, or of weight and measure, so that the finished preparation would have some definite, readily understood and easily remembered relation to the products of which it was composed. Unfortunately, the objections to the metric system of weights and measures was still strong, and, as a compromise, parts by weight were agreed on as the alternative.

This decision was not in keeping with the general practice, followed in this country as well as in England, of measuring liquids and weighing solids, and was strongly resented by a large number of pharmacists.

In addition to this the sub-committee having the publication of the Pharmacopœia in charge made the very serious mistake of deciding on a relatively high price for the book.

These two points, parts by weight and abnormally high price, were no doubt the more important factors that tended to make the Dispensatories once more pre-eminent with the rank and file of American pharmacists.

It should also be borne in mind, however, that the Dispensatories, in addition to translating parts by weight into definite formulas, had been thoroughly revised and had been brought fully up to date, as far as was possible with books of this particular type, and were, in addition to all of this, widely advertised by the respective publishers.

It is quite true that one of the most objectionable features of the 1880 Pharmacopœia, parts by weight, was modified in the revision of 1890, but it is also true that the introduction of metric weights and measures was rather in advance of the times and practices, very few pharmacists having acquired a practical knowledge of the metric system of weights and measures, few indeed using them in their routine work.

In conclusion, it might be said that there are other and very weighty reasons why the Pharmacopœial Revision Committee should not betray the trust that has been placed in it by the National Convention, as did the Revision Committee for 1870.

One, and one of the very important, reasons is the fact that since

the publication of the 1890 Pharmacopœia many States have enacted pure food and pure drug laws, and in almost all of these the United States Pharmacopœia is quoted as the standard for the purity and strength of the drugs and preparations enumerated by it.

Being, therefore, practically embodied in the statutes of these several States, it would appear imperative that the Pharmacopœia be continued as simple and direct as is compatible with an exhaustive treatise.

If any one will copy from one of the Dispensatories or other books, the Pharmacopœial formulas for, let us say, Fowler's solution, compound licorice powder and the compound tincture of benzoin, with the alternative formulas, as given *in extenso*, he will readily appreciate how easy it would be for a lawyer of but average ability to make such formulas appear ridiculous.

How different, and even misleading, these formulas appear when an attempt is made to make the alternative formulas fit in with convenient quantities is evident from even a most casual inspection of the latest edition of the British Pharmacopœia.

The only remaining alternative, the exclusive use of troy or avoirdupois weights and liquid measures, would be a serious retrogressive move, would prove a hardship on all that have accustomed themselves to think of galenical preparations as having a certain per cent. strength, and would also detract no little from any claims that the pharmacist might make to being classed as a professional man.

In summing up the present situation it might be said that, if we as pharmacists wish to be benefited by the giant strides that science is taking along all lines of thought and investigations entirely regardless of us as individuals, we must begin to realize that we must ourselves come in closer contact with the requirements of the times or fall by the wayside. We must appreciate that we cannot take part in twentieth century progress hampered as we are with eighteenth century ideas and methods.

To appreciate the work that is being done for us by others, we must thoroughly understand their object and their methods, and we must also realize that if we wish to continue as beneficiaries of any particular line of work we ourselves must be willing and able to take an active part in the development and advance of that particular line.

CALCIUM GLYCEROPHOSPHATE.

By H. B. Eigelberner.

Glycerophosphoric acid was discovered in 1840 by Pelouse, who obtained it by interaction of anhydrous phosphoric acid and glycerin. (American Journal of Pharmacy.) The formula being $C_3H_9PO_6$, consisting of a molecule of glycerin, a molecule of phosphoric acid, a molecule of water being set free in the active union.

Glycerin + Phosphoric acid = Glycerophosphoric acid + Water.

$$C_3H_5(OH)_3 + H_3PO_4 = C_3H_9PO_6 + H_2O$$

It was, however, not until 1894 that the salts of the acid were introduced in medicine by Dr. Albert Robbin of Paris. Dr. Robbin discovered them in Dr. Brown Sequard's Orchitic Extract, and declared them to be the active principle of that famous "Elixir of Life." Chemically they are compounds of various bases with glycerophosphoric acid. The rationale of the use of glycerophosphates is that they contain phosphorus in the same state as it exists in the nerve tissues of the body, and constitutes, therefore, a natural form of administering phosphorus, it being at once assimilated without further change. This is based upon the theory that the lecithin of food is converted into glycerophosphoric acid before assimilation, the theory resting upon the fact that the glycerophosphate salts are found in Orchitic Extract and in the extract or nerve tissue generally. (*American Druggist.*)

A. and L. Lumiere and F. Perrin have succeeded in preparing glycerophosphorous acid by treating a slight excess of glycerin with phosphoric trichloride, keeping the mixture cool. The hydrochloric acid formed is removed from the mixture by means of moist silver oxide, after filtration from the AgCl thus formed, the glycerophosphorous acid is saturated with a base, such as lime, and the excess of glycerin removed by means of alcohol, or the original acid mixture may be directly neutralized with lime, evaporated at a low temperature and then treated with alcohol, which removes calcium chloride and glycerin, but precipitates calcium glycerophosphite. Free glycerophosphorous acid has not been isolated, since it tends to saponify on evaporating its solutions. (Proceedings of the Pharmaceutical Association, 1902.)

A good method of manufacture for calcium glycerophosphate is that proposed some years since by Portes and Primier in the *Repertoire de Pharmacie.* (American Journal of Pharmacy.)

3 kilos phosphoric acid, 60 per cent.
3 kilos 600 grammes glycerin (sp. gr. 1·24).

Mix together and keep at a temperature of 100–110° C. for six days, agitating three or four times daily. The second day it commences to color and emit fumes; the fifth day it will have turned brown and ceased to fume; on the seventh day it is allowed to cool, and is then viscous and transparent. After cooling, the free acid is neutralized by mixture of 500 grammes calcium carbonate in 2 kilos of water, and allowed to settle two or three hours, when more of the chalk mixture is added and the process repeated until all the acid is saturated, which generally takes about two days. The mixture is filtered, and the filtrate exactly neutralized by means of 90 per cent. alcohol. The precipitate which forms settles very rapidly; after about an hour the supernatant fluid is decanted, the precipitate is washed and drained. It is then redissolved in cold water, filtered and evaporated at a low temperature. The salt thus obtained is a white crystalline powder, soluble in 15 parts of cold water, almost insoluble in boiling water, insoluble in alcohol.

The reactions involved in the manufacture of calcium glycerophosphate are represented by the following equations:

(1) Glycerin + Phosphoric acid = Glycerophosphoric acid + Water

$$C_3H_5(OH)_3 + H_3PO_4 = C_3H_9PO_6 + H_2O$$

(2) Glycerophosphoric acid + Calcium hydroxide + Water =

$$C_3H_9PO_6 + CaOH + H_2O =$$

Glycerophosphate of calcium

$$C_3H_8CaPO_6 + 2\ H_2O$$

The theoretical amount of calcium oxide in calcium glycerophosphate is, therefore, about 22·66 per cent.

The estimation of this ingredient (calcium) is the keynote of the examination of calcium glycerophosphate, for if true glycerophosphoric acid is not formed in the first reaction, the free phosphoric acid left uncombined will require a larger percentage of calcium for neutralization, and will thus be shown by this determination. A sample of an English brand of calcium glycerophosphate examined contained 33·05 per cent. of calcium oxide and was slightly acid in reaction. This would tend to prove the above assumption.

In estimating the calcium, I followed the usual method as given

by Fresenius—precipitating as the oxalate and weighing as the oxide.

A number of samples examined showed:

Calcium oxide: 21·6 to 22·5 per cent.

Chlorides and sulphates: Traces—small amounts.

Solubility tests: About as given in preceding parts of paper.

Reaction: Slightly acid—to somewhat alkaline.

Physical appearance: From bulky, white powder to small pearly white crystals.

The above examination is not exhaustive, but is rapid, approximately accurate, and enables the pharmacist to arrive quickly at comparative valuations between different samples of calcium glycerophosphates.

CHAPMAN & SMITH COMPANY, Chicago.

RESEARCH IN MANUFACTURING PHARMACY.

BY HENRY KRAEMER.

The original investigator has always been assured honor and a more than passing record of his work, the permanence depending upon the true significance or value of his achievements. At the present time the research worker has, in addition, a chance to win some of the largest prizes. Not only are specific sums available as in the Nobel prizes, but other funds are at the command of investigators, as those set aside by the Carnegie Institution. Moreover, there are opportunities on every hand, in universities as well as in manufacturing laboratories, for the right men to conduct research and make great discoveries.

Many remarkable discoveries have been made by those connected with universities. In recent years very many of these discoveries are due to the impetus as well as financial assistance and facilities of the laboratories of large manufacturing houses. The many alkaloids of cinchona, opium, etc., or the constituents of many of the volatile oils would probably never have become known were it not that tons of material have been worked up in large manufacturing laboratories and the material placed at the command of research workers.

Not only is this true, but we are also much indebted to some of these manufacturing firms for very valuable information which they

are publishing as a result of their own researches in addition to giving condensed summaries of the progress in the different fields in which they are particularly interested. Some of these firms are, furthermore, willing to conduct investigations at the suggestions of responsible persons. It is not unusual to find in the semi-annual reports of Schimmel & Co. the results of researches of this kind. In the last report (October–November, 1903) we read:

"Prof. Dr. E. Strasburger, of Bonn, while on a visit to the Riviera this spring, was kind enough to call our attention to some plants growing there which in the fresh state are extremely fragrant. At our request Prof. O. Penzig, of Genoa, very willingly took the trouble of procuring us fairly large quantities of these herbs in a half-dried condition, and he has thereby enabled us to make some trial distillations. We avail ourselves of this opportunity to express again to both gentlemen our very sincere thanks for the pains they have so kindly taken.

"Although the distillations have given no results which are useful for practical purposes, as the aroma was totally destroyed during the drying and the distillation, and the distillates in no case shared the characteristic odor of the fresh plant, we desire to mention here the properties of the oils obtained."

Then follows a brief account of the distribution of the following plants: *Psoralea bituminosa* L., *Inula viscosa* Desf., and *Helichrysum angustifolium*, Sweet, and the analytical data of the oils yielded by them.

A very interesting part of this same report of Schimmel & Co. is the article contributed by Prof. Dr. R. Kobert, Director of the Institute for Pharmacology and Physiological Chemistry of the University of Rostock, on "The Pharmaco-therapeutics of the Æthereo-oleosa." He divides these into the following groups: (1) Odor-corrigents; (2) Taste-corrigents; (3) Stomachics, digestants and carminatives; (4) Uterine remedies, emmenagogues and abortifacients; (5) Diuretics; (6) Diaphoretics; (7) Antihydrotics; (8) Antiseptics; (9) Leukotactics; (10) Antiparasitics; (11) Antidotes; (12) Dermerethistics; (13) Excitants; (14) Sedatives and narcotics, and (15) Expectorants.

This article is full of good common sense and the apothecary should know the facts and transmit to the public. Under odor-corrigents, for instance, Dr. Kobert says:

"Although we physicians may preach ten times *mulieres bene olent, si nihil olent*, the weaker sex will continue to buy perfumes and to enjoy them. We must be content if only poisonous substances are not allowed to be added to these mixtures. But we will never consent to the so-called improvements of

the air in the sick-room by *fumigating powders* and *fumigating essences;* on the contrary, we will make it clear to the rising generation, with our utmost energy, *that constant renewal of air is the best odor-corrigent of the sick-room.* In the same manner, patients who suffer from bad-smelling breath should not go to perfumery shops, but to *the dentist*, or *the specialist for the nose or the lungs.* Even for healthy persons, perfumes are only admissible in homœopathically minute doses."

The reports of Schimmel & Co. are invaluable and have contributed much to a healthful development of the essential oil industry, both from technical and medical points of view.

The annual reports of Merck & Co., on "The Advancements of Pharmaceutical Chemistry and Therapeutics," have also been important contributions to pharmaceutical and medical literature. The present report, issued last July, is an epitome of the researches for 1902, but contains much information that even yet has not become thoroughly disseminated among the professions. The papers by Prof. R. Kobert on "Ipecacuanha and its Active Principles" are referred to, and it is interesting that both he and Carl Lowin, a student of Kobert, confirm the investigations of Paul, Cownley and Wild (see this JOURNAL, February and March, 1901), that emetine and cephaeline act in a distinctive manner, emetine giving rise mainly to expectoration, whilst cephaeline induces prompt and facile vomiting.

R. B. Wild has recommended the use of either alkaloid in the place of the galenic ipecacuanha preparations, since the latter contain a variable proportion of alkaloid, according to their origin (*i. e.*, whether Rio or Carthagena is used); whereas the alkaloids possess a precise therapeutic value. The hydrochlorate and hydrobromate of emetine are available for use as expectorants, depressing media or emetics. The author employs a very permanent solution of 0·06 gramme of the hydrobromate in 30 c.c. of 20 per cent. alcohol and prescribes of this 5-20 drops to induce expectoration and depression, whilst 2·0-5·0 c.c. serves as an emetic dose. As a substitute for Dover's powder, Wild employs a solution containing 1 per cent. morphine and $\frac{1}{500}$ per cent. hydrochlorate of emetine. Hydrochlorate of cephaeline is less active in affections of the air-passages than the emetine salts. Its emetic properties are so intense as to render it difficult to properly adjust the correct dosing.

The "Ephemeris of Materia Medica, Pharmacy, Therapeutics and Collateral Information," by Dr. E. H. Squibb, contains brief comments on the advances of the year ending July 1, 1903. Like the preceding firms' publications, "Ephemeris" is sent to all those who are supposed to be interested in its contents. The first paragraph in this monograph is well worth publishing nearly entire, as for some

time there was a disposition to reason by analogy concerning the merits of every new compound and there has thus resulted confusion.

"It should be gratifying to the medical profession in general, but especially to the scientifically inclined, to learn that there are increasing evidences from many quarters that new agents now offered are submitted to a far more critical preliminary test before presenting to the profession for trial than ever before, because the profession is declining to accept unsupported overtures. This fact has surely had a wholesome effect on those who would press forward novelties before establishing their worth on scientific lines, for a much fewer number of products have been presented to the attention of physicians than ever before. Those which have come forward have had much more reason to exist and receive attention, even though they may finally fail to accomplish the promised results. The profession, therefore, is now much more encouraged to take up a new agent when presented on rational lines."

While the "Ephemeris" by Squibb & Sons is almost entirely devoted to a review of the progress in therapeutics, there are some statements of general pharmaceutical interest. Under acetic acid the statement previously made is repeated, viz., "that a 10 per cent. acetic acid menstruum is quite the equal of a 41 per cent. alcoholic menstruum for the extraction and preservation of the medicinal properties of drugs." Six other fluid extracts have been experimented with, using acetic acid as a menstruum. Among these is opium, which has been standardized to contain not less than 13·5 per cent. of morphine. "As a concentrated solution of opium containing all the valuable medicinal constituents without any of its nauseating or odoriferous properties, it has much to commend it and deserves the attention of all practical workers."

The newest publication from a manufacturing house is called "Digest of Researches of Laboratory Workers," and is published by Smith, Kline & French Co. It has been edited by Joseph W. England, and differs from the previous publications referred to, in that it consists almost entirely of abstracts of the published papers of those employed in the laboratory of this firm. The statement is made that upwards of 200 "papers," embracing nearly 500 pages of printed matter, have been published in the various technical journals by these laboratory workers. The range of subjects is wide, including, besides the examination of pharmacopœial drugs, curious oils, artificial foods, chemical synonyms, etc. While some of the conclusions in some of the papers should be criticized on the basis of the facts given, nevertheless, taking the collection of papers as a whole, they are creditable. This pamphlet will appeal par-

ticularly to the retail pharmacist, and will, no doubt, accomplish much in causing him to test his purchases.

The pages of this JOURNAL, as well as other pharmaceutical and technical journals, contain many papers contributed by the research workers of various manufacturing houses. In many instances these workers are graduates of colleges or universities. These papers do not necessarily always contain all the information that might be given. They have been, nevertheless, beneficial in every way to the authors, and the latter are deserving of the thanks of the readers. I have heard it said that some manufacturers do not care to have their laboratory workers publish the results of their findings of market conditions, and that those who want this information can find it out for themselves. It should be said that if others want the information for commercial purposes, they certainly must find it out for themselves whether anything is published or not. In other words, in commerce nothing can take the place of a man's own knowledge of a subject or a specimen, and no other person's analysis of another lot will help him.

There are three benefits that come from publication of research work:

(1) The first benefit is to the research worker himself. In going over his work and marshalling his facts he is compelled to check his results, find out his errors and perfect his methods.

(2) The next benefit is one as it affects the race and serves to develop a literature, consisting of records of man's experience in the progress of civilization.

(3) The last benefit is one as it affects the community and serves to protect the public by the enlightenment of the physician and pharmacist.

Investigations on the nature and quality of drugs are giving us new methods for their valuation. Experience is showing the physician that he must depend upon the intelligent pharmacist for his medicaments of standard quality. Furthermore, the retail pharmacist is responsible for the quality of the medicines he dispenses and the drugs he sells, and by testing his purchases he not only protects himself against the unscrupulous dealer, but also co-operates in so doing with the honest wholesaler. There are mistakes made by the latter which require correction just as much as the mistakes of the physician, and we thus cannot fail to see the dual responsibility of the retail pharmacist.

The object of this paper has been to call attention to the value of not only research, but the publication of the results of original investigations, and to indicate by reference to some recent publications the part that the manufacturing pharmacist has in this beneficent work.

THE ITALIAN OLIVE OIL ON THE AMERICAN MARKET.

By A. Augusto.

The problem of olive oil in America, from the medicinal point of view, has to be considered carefully and without any preconceived idea.

Olive oil is olive oil, nothing else but the expressed oil of olives. Therefore, its purity and taste depend absolutely upon the method employed in making, refining and preserving it.

In America is enrooted the idea that only Lucca, in Italy, produces good olive oil, and consequently, on the American markets, any oil which would not have written in big letters on the can or label the magic word Lucca, would not be considered.

I am talking to business men, and I suppose that each one of you is proud of his store and his own preparations. Exactly the same feeling animates the producers of olive oil in Southern Italy. They are simply proud of the fine quality of their oil, and they dislike the idea of misrepresenting their goods, giving them the maternity of Lucca, only to meet and overcome the unjust stubbornness of the American markets.

The fine quality of their olive oil does not need any advertisement; generally the demands are greater than the production, because other nations, France especially, are too glad to have it, and let it pass in the markets of the world as their own production.

To provide the American markets with olive oil there is left only one way: to pass under the guns of the so-called importers of New York and exporters of Leghorn.

Both those *intercommercial elements* do their best to enlarge their profit, and consequently the greater quantity of *the would be* Italian olive oil is manufactured (the word adulterated is not enough) in New York, while when ordered directly from Italy the oil merchants over there send here the lowest degree to meet the great American cry, "cheap, cheap."

There are many ways of making olive oil, but the oldest, slowest and most expensive method has uncontested preference to the new, quick and economical methods.

The old method consists in picking the olives before they are too ripe, grinding and pressing them, separating the oil from the muddy water and depositing it in proper vessels until, with the coming of the warm season, it becomes clear. Then, after being decanted two or three times at intervals of a few weeks, it is ready to go into commerce.

I said that this method is very expensive, and it is so. The olives are picked by hand because, being not ripe, they are attached firmly to the plant. They must be ground and pressed the next day, and three men and one horse are required to work out 20 or 25 bushels of olives in one day, producing an average of 12 gallons of oil, and fresh olives do not give as much oil as those which have been kept for a few weeks. Besides all these expenses and losses one has to wait almost a year before his oil has reached the grade of maturity and purity required for a first quality article.

Any one who can afford to make his oil in such a manner and wait indefinitely for selling it, surely will have his price, because olive oil, when properly made, does not deteriorate with age, but improves, while oils made by modern methods become rancid and putrid when summer heat comes.

That explains why in Italy in two villages at a few miles distance, the price of olive oil varies from 12 to 25 cents per litre.

Something must be said about properties and elementary tests of olive oil; but this is not an easy task for me, considering that olive oil is largely subject to adulteration, and I am talking to persons who, perhaps, have never had a chance to taste a first quality of it.

Of course, for an Italian who, as the one who has the honor to address you, has had chances to plant and cultivate olive trees, who has picked olives, manufactured oil, and uses largely of it, there are three tests to be applied in the assay of olive oil, namely, looking at it, smelling it, and tasting it. He knows that fine olive oil must be of a pure, clear, light amber color, without any trace of green; odorless, except that little pleasant smell proper of olive oil, and of a fresh, fragrant, soothing taste.

A very simple test of olive oil can be made in the following way: On a plateful of hot boiled vegetable, as winter salad, put salt and

one or two tablespoonfuls of the oil. Pure olive oil will not give any disagreeable smell and the dish can be eaten, according to my taste, with pleasure; but impure or second quality of oil will give out, under these circumstances, a displeasing odor, and a dry, disagreeable sensation is produced in the throat if an attempt to swallow it is made.

But here comes the question: How can the Americans obtain pure Italian olive oil?

The only answer that I can give is very simple: Buy from the producers and reject the so-called Lucca oil, because Lucca can hardly supply herself with her own oil.

In the large Italian cities, in spite of a law against adulterations, pure olive oil cannot be obtained so easily. The law is not complete because it tends to prevent only adulterations injurious to health. So the majority of the people are often compelled to receive their supply of oil for domestic use directly from the country, paying a good price for it.

The Americans cannot do the same, but they can encourage direct importation.

A PRESCRIPTION FILE.

By J. W. P. Outerbridge.

This file is constructed of a brass rod (No. 8), and is held in a rigid, perpendicular position between two iron brackets (or shelves) by the aid of three nuts—*a*, *b* and *c*, as shown in the figure. Into the lower end of the wire a hole *d* is bored.

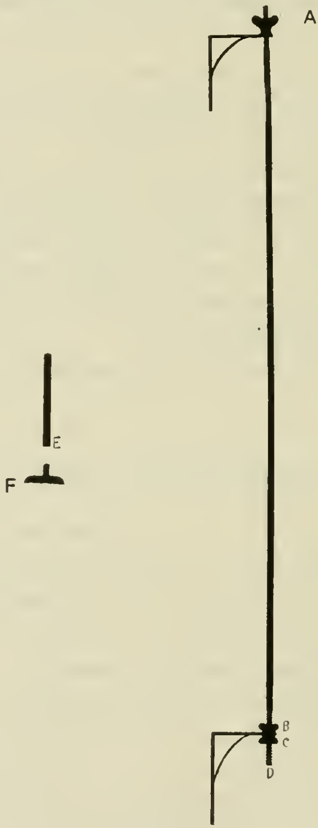
The desk file consists of a short piece of No. 8 wire with an inner thread *e*, screwed to the base *f*. The thread *e* is similar to that of *a*.

To transfer the prescriptions from the desk file to the permanent or stationary file, unscrew the nut *a*, curve the wire slightly so as to bring the upper end out of the bracket, unscrew the desk file from its base and screw onto the permanent or stationary file. At the close of the year, unscrew the nuts *a* and *c*, remove the file from the brackets, unscrew the nut *b*, insert a pointed wire into the hole *d*, transfer the year's prescriptions to this new file, and set up the original file for use again.

I would suggest that the files for two or three years back, which are kept at hand for renewing prescriptions, be held in a rigid, per-

pendicular position by hanging them between iron brackets, or between two shelves, and if convenient an easily movable curtain may be hung from the shelf; old files when put away could be protected from dust in this way.

Do not point the desk file, but use a punch for the prescriptions. This has two advantages: (1) It prevents the wear and tear of the



A Prescription File.

centre of the prescriptions; (2) the prescriptions can be moved on the file so much more easily that time is saved when referring to old prescriptions. When renewing a prescription, the place may be held open by means of a wooden clip. And a piece of card-board filed every month will probably aid in referring to a prescription.

Some of the advantages of this file are the easy method of trans-

ferring the prescriptions from the daily file to the yearly file. When referring to prescriptions in the early part of the year the file is held permanent and there is not the danger of a sharp hook coming down on one's head; and the prescriptions being punched and held out of contact with anything, there is very little friction to overcome when referring to old prescriptions.

HISTORICAL NOTE ON THE AMERICAN JOURNAL OF PHARMACY.[1]

By Henry Kraemer.

Entering now, as we do, upon the last quarter of one century of The American Journal of Pharmacy's existence as a regular publication, it may be of interest to review briefly its history up to this time, and in doing this I shall draw rather freely upon the "Historical Notice" published in connection with the General Index in 1873.

The Journal of the Philadelphia College of Pharmacy was established in 1825, and the Publication Committee consisted of Dr. Samuel Johnson, Henry Troth, Solomon Temple, Ellis H. Yarnall and Daniel B. Smith, the latter of whom was chairman of the committee, and practically acted as editor, and to whom belongs the credit of establishing a high standard for the *Journal*. Too much credit cannot be given to the members of the committee, who laid the foundation along lines which it has never been considered advisable to depart from. They were all men of ability, and their work reminds one of the work of those who drafted the Constitution of the United States.

Four preliminary numbers were published up until 1829, when the Publishing Committee was reorganized, as follows: Daniel B. Smith, Charles Ellis, S. P. Griffiths and Dr. George B. Wood, with Dr. Benjamin Ellis as the editor. At this time the publication of the regular volumes began, and since then the publication has been uninterrupted. From now on up until 1852 four numbers constituted a volume, except in 1847, when five numbers were published. On the decease of Dr. Ellis, in April, 1833, Dr. Robert E. Griffith was appointed editor, and during his incumbency in 1835 the Publishing Committee was reorganized by the addition of Dr. Bache,

[1] This is part of the annual report of the editor of The American Journal of Pharmacy to the Philadelphia College of Pharmacy, March 28, 1904.

Elias Durand, W. Hodgson, Jr., Joseph Scattergood, John C. Allen and Dillwyn Parrish, and the name of the *Journal* changed to its present title, THE AMERICAN JOURNAL OF PHARMACY.

In October, 1836, on the resignation of Dr. Ellis, Dr. Joseph Carson was chosen editor, and he associated with himself Dr. Robert Bridges as associate editor from 1839 to 1845, and from 1848 to 1859 Prof. William Procter, Jr. During the editorship of Dr. Carson several circumstances transpired to improve the scientific character of the JOURNAL. The invitation to the Philadelphia College of Pharmacy from the Official Committee to participate in the revision of the U. S. Pharmacopœia in 1840 gave an impetus to pharmacy in Philadelphia which resulted in the establishment of the Pharmaceutical Meetings of the College, which were then, as now, a source of original contributions.

In 1839 Joseph Scattergood resigned from the committee. In 1842 the names of Ambrose Smith, William Procter, Jr., Augustine Duhamel and William R. Fisher were substituted for those of Daniel B. Smith, J. C. Allen, W. Hodgson, Jr., and Dillwyn Parrish, resigned. In 1845 Messrs. Wood, Bache and Durand retired from the committee, and Thomas P. James was added, and in 1846 Dr. Bridges was added. In 1848 the following committee was elected: Daniel B. Smith, Dr. Bridges, Charles Ellis, Ambrose Smith, Dr. Carson and Professor Procter. In 1849 Edward Parrish was elected in place of Ambrose Smith, and in 1850 A. B. Taylor in place of Daniel B. Smith.

On the retirement of Dr. Carson in July, 1850, William Procter, Jr., was chosen editor, and the Publication Committee consisted of the same members, there being no change until 1861, when John M. Maisch was elected in place of Dr. Bridges, and in 1870, when Thomas S. Wiegand replaced Edward Parrish.

In 1848, while Professor Procter was assistant editor, an editorial department of the JOURNAL was started, and, during his incumbency as editor, was a marked feature. From 1853 to 1870 six numbers constituted a volume, and in 1852 an advertising sheet was introduced, and the price increased from $2.50 to $3, whilst the reading matter was nearly doubled. It was at this time that the American Pharmaceutical Association came into existence, and for several years the minutes of the proceedings and most of the papers were published in the JOURNAL almost verbatim, although no official con-

nection existed. Ever since then the JOURNAL has sent a representative to the meetings of the Association, and given a full account of its proceedings. The JOURNAL made notable progress until the War set in, when it became very much hampered in its work, but the editor and committee persevered through this crisis, and in 1865 a reaction set in, which finally culminated in the election of a business editor, Henry H. Wolle, in 1871, being chosen to fill this position. Another change brought about by Professor Procter was that of making the JOURNAL a monthly publication, which began in 1871.

On the resignation of Professor Procter in April, 1871, due to failing health, Prof. John M. Maisch was chosen his successor, the Publication Committee chosen at this time consisting of the following members: Professors Procter and Maisch, and Messrs. Bullock, Taylor and Wiegand. A regular organization of the committee was effected, and a chairman, secretary and treasurer selected. In March, 1872, James T. Shinn was elected in place of A. B. Taylor, and in 1874, on the death of Professor Procter, Henry N. Rittenhouse was chosen a member of the committee. Professor Maisch was assisted in his work as editor by the following collaborators: Geo. M. Beringer, Joseph W. England, Frank X. Moerk and Professors Remington, Sadtler and Trimble. On the death of Professor Maisch, Prof. Henry Trimble was elected editor, and the Publication Committee reorganized as follows: Henry N. Rittenhouse, Samuel P. Sadtler, Wallace Procter, Joseph W. England and the editor. On the resignation of Mr. Wolle in 1894, Florence Yaple was chosen his successor, as business manager, at the suggestion of Professor Trimble.

On the death of Professor Trimble in 1898, the present editor was chosen. In March, 1900, the Publication Committee was increased to seven members, and Dr. Richard V. Mattison and Prof. Joseph P. Remington were the additional members chosen.

As I have stated in a previous report, every effort is being made to make the JOURNAL true to its name; that is, an *American* journal of pharmacy, which will encourage research by American pharmacists, and which will at the same time be of direct value to the profession at large, and an influence for the betterment of the condition of pharmacy in America.

CORRESPONDENCE.

February 25, 1904.

Prof. Henry Kraemer.

Dear Sir :—I was very much interested in your article in the December number of the American Journal of Pharmacy on "The Conservation and Cultivation of Medicinal Plants."

You mention the fact that the supply of drug plants is becoming exhausted, and that they will have to be supplied by cultivation.

I wish to make a few statements of my observation of the medicinal plants growing in California. As we have in the State nearly all conditions of climate and soil that can be found in most any part of the north temperate zone, I think the State is capable of producing any plant found in the same zone and a great many of the torrid zone.

Plants that are brought into the State and transplanted in the proper places, where conditions are favorable, seem to thrive as well and oftentimes better than in their native soil. The eucalyptus in the South grows well and very rapidly; it is planted around fields for wind-brakes and sometimes in groves for fire-wood. A grove of four years' growth will furnish cord-wood—hardly long enough for an eastern tree to obtain a growth sufficient to be transplanted. The phytolacca also obtains a larger size here than in the Eastern States. This plant was evidently brought out by early settlers, but at the present time is growing wild. The castor-oil plant also attains a large size here.

As to the conditions existing here, in the South we have the hot, sandy desert, well adapted to the cactus and to any of the Cucurbitaceæ, as the colocynth. At Indio, in the dry sea bed, muskmelons and watermelons thrive when irrigated. Near the mouth of the San Joaquin River, is light, sandy soil suitable for such as the sassafras, while in the immediate neighborhood of Humboldt Bay it is always cool and damp; it is so wet that grain cannot be ripened, but the dairymen grow green fodder for their stock every month in the year.

In this valley we occasionally have a freeze; at the present time it is quite pleasant here, the grass and grain being quite green, while six miles above here there are 4 inches of snow. We also have the high mountain ranges, with an occasional frost in the valleys and snow nearly all the year on the peaks. Along the coast is the sea

fog. In Ventura and Santa Barbara Counties the bean and beet crops are grown with the aid of the moisture of the fogs.

So you see we have the proper conditions for plants needing a dry, hot climate, a damp, cool climate—cold winters and hot summers, or an even climate the year around, such as is found around San Francisco Bay.

At Santa Barbara is a private botanical garden in which it is said plants from all parts of the world are growing. I have seen the garden, and the appearance will bear out the statement.

There are several large and successful seed farms in the State, and the seeds are considered of fine quality. Near Haywards is a peppermint farm, producing oil of peppermint. Olive oil is also produced in large quantities in the State; the quality is as good or better than the Italian.

In the hills near Oakland, the camphor tree is growing wild; also bamboo; the camphor tree was planted to produce camphor for the market, and I suppose the bamboo was brought over at the same time. The camphor tree grew and flourished and produced camphor, but it cost from $1.50 to $2.00 per pound, when camphor was selling in the market at 50 to 60 cents per pound. While the tree was a success, the business was not; but at the present indications, if camphor continues to advance and labor becomes cheaper, California will be able to hold the camphor market in check, and not be at the mercy of the Japanese government. At the present time, the tree springs up in the unplowed field, like sassafras does in New Jersey. It is found there now as a bush of a few feet in height.

Following is a list of the medicinal plants I have observed growing here: Peppermint, pennyroyal, cascara sagrada, balm of gilead, horehound, mustard (cultivated), catnip, phytolacca, stramonium, tansy, quercus (yielding nut galls), yerba santa, yerba buena, fennel, spikenard, rumex.

At Vallejo I have seen rank growths of fennel in the streets near the water fronts; in this county I have observed the alder, which in the East grows as a bush along the water courses, growing like a tree, having a height of 35 to 40 feet and a diameter of 8 to 10 inches.

With most plants in this State, it is not a case of "Will they grow?" but "Will it pay to grow them?"

Yours very respectfully,

W. H. Guest.

Willits, California.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

A METHOD FOR THE IDENTIFICATION OF PURE ORGANIC COMPOUNDS. By a systematic analytical procedure based on physical properties and chemical reactions. Vol. I containing classified descriptions of about 2,300 of the more important compounds of carbon with hydrogen and with hydrogen and oxygen. By Samuel Parsons Mulliken, Ph.D., instructor in organic chemistry and organic analysis at the Massachusetts Institute of Technology, Boston, Mass. New York, John Wiley & Sons; London, Chapman & Hall, Limited. 1904. Large 8vo, xii + 264 pages. Cloth, $5.00.

The identification of organic compounds of all classes by the Method of the Empirical Formula; *i. e.*, depending upon a knowledge of the chemical constants, percentage, composition and molecular weight, is the method generally employed and is usually fairly satisfactory in the hands of the skilled analyst. There are, however, many other available data which have considerable significance in the identification of unknown organic compounds and on account of the ease with which many of these tests may be made should be utilized in a comprehensive scheme.

Dr. Mulliken has applied himself to this task, and during the past eight years has carefully considered the more easily determined properties of more than 2,000 of the more important organic compounds, such as qualitative elementary composition, color, melting point, boiling point, solubility, specific gravity, alkali neutralizing power and chemical behavior under prescribed conditions, and has, we believe, devised a system which not only has the merit of originality, but which we believe will be found, from a practical and technical point of view, to be simple and to yield satisfactory results.

The author has utilized Linnæan principles in creating orders, genera and species of organic compounds. The "orders" are based on the qualitative elementary composition of the compounds comprising the largest groups. Each of these then are subdivided into "genera," as aldehydes, acids, phenols, etc., depending upon the behavior of the compounds to simple chemical tests. The genera include species, which are arranged according to the increasing value of some readily determined constant, like the melting point or boiling point. Finally, under each species is given a brief systematized description of salient features having genuine analytical

significance. This system of classification is an excellent one, and as it has been in use in the natural sciences for many years with excellent results, so far as the determination of animals and plants is concerned, is probably the only satisfactory way of looking at chemicals with the end in view of finally determining an unknown organic compound. The work will not only appeal to chemists, but botanists and zoologists as well, as the evolution of organic compounds in nature is very likely in the near future to demand considerable attention from students of these branches of natural science.

In order to give our readers a better idea of the nature of the book, we give a rather comprehensive view of the contents, as follows:

Chapter I: Classification of compounds and the analytical procedure, including explanation of classification, orders, genera, divisions, sections, species; general directions for examination of unknown compounds—evidences of homogeneity; examinations of physical characteristics; determination of order; determination of genus; tabular summary of generic tests; determination of division and section; determination of species. Chapter II: Ordinal tests, including procedure for detection of the elements in organic compounds, as carbon and ash constituents; sulphur, nitrogen and the halogens; ignition with sodium; sulphur; nitrogen; nitrogen and sulphur together; phosphorus; halogens; iodine; bromine; chlorine. Chapter III: Genus I (Subord. I, Ord. I).—Aldehydes, giving generic characterization. Generic Test I; observations on test; aldehyde characteristics; analytical tables, Div. A (solid species), Div. B (liquid species), numbered specific or semi-specific aldehyde tests. Compounds reducing Tollen's reagent, acetaldehyde, acroleïn, benzaldehyde, formic aldehyde, furfurol. Chapter IV: Genus II (Subord. I, Ord. I).—Carbohydrates, giving generic characterization, analytical tables and numbered sectional and specific carbohydrate tcets. Chapter V: Genus III (Subord. I, Ord. I).—Acids, including generic characterization, analytical tables and numbered specific or semi-specific tests. Chapter VI: Genus IV (Subord. I, Ord. I).—Phenolic compounds, including generic characterization, analytical tables and numbered specific or semi-specific tests. Chapter VII: Genus V (Subord. I, Ord. I).—Esters, giving generic characterization and analytical tables. Chapter VIII: Genus VI (Subord. I, Ord. I).—Acid anhydrides and lactones, including generic charac-

terization and analytical tables. Chapter IX: Genus VII (Subord. I, Ord. I)—Ketones, including generic characterizations, analytical tables and numbered specific or semi-specific ketone tests. Chapter X; Genus VIII (Subord. I, Ord. I).—Alcohols, including generic characterization, analytical tables and numbered specific or semi-specific tests. Chapter XI: Genus IX (Subord. I, Ord. I).—Hydrocarbons, etc., including generic characterization and the sectional tests, analytical tables and numbered specific or semi-specific tests. Chapter XII: Suborder II of Order I.—Colored compounds of Order I, including subordinal characterization, analytical tables and numbered specific tests. Chapter XIII: Special methods, apparatus and reagents, including melting- and boiling-points, thermometric indications of chemical purity, specific gravities, color, the manipulation of small quantities and list of special reagents and apparatus. Finally there is an alphabetical index, a formula index and a color standard.

The entire work shows care and patience upon the part of the author, and is one of the most valuable analytical works which has been published. The only suggestion which might be made, and yet no doubt the author has considered the advisability of it, would be to give more than one test as a generic test. For instance, under carbohydrates the Molisch color reaction with α-naphthol alone is given. If instead of α-naphthol a solution of thymol is used in conjunction with sulphuric acid, a reddish colored solution results instead of a blue color. Both of these reactions are very sensitive and characteristic for carbohydrates.

IN MEMORIAM—J. B. NAGELVOORT.

By A. B. Lyons.

It was with a shock of surprise as well as with deep regret that I read in the Detroit morning paper of March 2, 1904, the announcement of the death of J. B. Nagelvoort. Only a few days before I had received from him a letter, dated February 22d, which showed no indication of any decline in his bodily or mental powers. It related to the subject of some researches he was carrying on, and enclosed photographs of plants of Hyoscyamus niger in exchange for some I had offered to send him of some of the wild plants of that species at Mackinac. After signing his name with free, firm

hand, he added the characteristic postscript: "Please don't call me professor!"

The end, in fact, as I learned afterwards, had come to him without warning. One week after the date of that letter, he retired to rest as usual, but it was to sleep the sleep that knows no awakening. "Heart failure" tells the whole story, so far as is known to any of us.

It was such an end as I am sure he would have coveted—with no period preceding it of declining powers, with unfinished work yet luring him on.

His life had been one of diversified experiences. Born in Amsterdam, July 14, 1843, he began work as an apothecary at the early age of fourteen. Later he attended college at Hague. About the year 1868 he received an appointment under the Dutch Government in the hospital service in the East Indies. He was stationed in Java, and occupied a position of weighty responsibility. Here he married, his wife being also a native of Holland, and here several of his children were born. His health having become impaired, he returned in 1878 to Holland, and then decided to make his home in America. He took up land in Nebraska, and for five years devoted himself to farming. This life, however, did not satisfy his higher ambitions. In 1883 or 1884 he returned to Holland to pursue further his studies in chemistry, and then accepted a position in the scientific department of Parke, Davis & Co.

From this time he became a frequent contributor to current pharmaceutical literature. In 1892–3 he made a translation for publication of Professor Flückiger's "Reactions of the More Important Organic Compounds." About the same time he contributed to the *Apothecary* a series of valuable "Notes on the Pharmacopœia," in view of the decennial revision then in progress.

In 1895 he accepted the chair of Applied Pharmaceutical Chemistry in the Northwestern University, a position he filled with distinction for two years. He then returned to Holland, and was for two years an instructor in the School of Pharmacy of the Rijks University at Leyden.

In 1901 he returned to America to accept a position with a manufacturing house in New Orleans; but his engagement there was not of long duration. Last year he found exactly the position that suited his temperament and gave opportunity for the use of his accumulated resources of knowledge and chemical skill. A labora-

tory for research was established in connection with the botanical gardens at St. Louis, Mo., where, in association with Dr. Trelease, he entered upon a line of work thoroughly congenial to him. The country suffers a distinct loss in the cutting short of so promising a career of usefulness.

Mr. Nagelvoort was a man of pronounced personality. His ideals were beyond the comprehension of a commercial age like ours, and no consideration of personal advantage ever influenced him to sacrifice one iota of them. No doubt he was not sufficiently tolerant sometimes of the views of those with whom he was associated, but his supreme regard for honesty and his absolute independence of action gained for him universal respect.

In Athens, more than two thousand years ago, Diogenes sought in vain for a single honest man. They are not less rare in this enlightened day and age, but those who knew J. B. Nagelvoort were sure that honesty was incarnate in him.

PHILADELPHIA COLLEGE OF PHARMACY.

THE EIGHTY-THIRD ANNUAL COMMENCEMENT.

The Eighty-third Annual Commencement of the Philadelphia College of Pharmacy was held in the American Academy of Music, Thursday evening, April 14th. After prayer by Rev. Cassius M. Roberts, the degrees were conferred by the President of the College, Howard B. French. Following are the names of those receiving the degree of Doctor in Pharmacy (P.D.), together with the subjects of their theses:

Name.	*Subject of Thesis.*	*State.*
Althoff, Samuel Young,	Principal Sources of Commercial Drugs,	Pennsylvania.
Baker, Howard Stanislaus,	Solanum Carolinense,	New Jersey.
Bartholomew, Arthur D.,	The Cotton Plant and Preparations,	Pennsylvania.
Bee, William Frederick,	Soft Capsules and their Preparations,	Utah.
Beyer, Albert Franz,	Phenacetin,	New Jersey.
Binder, Furman Brooke,	Eucalyptus Globulus,	Pennsylvania.
Bogert, Charles Halsey,	Caoutchouc,	New Jersey,
Boltz, Howard Hauer,	Spongia,	Pennsylvania.
Boyer, Howard Johns,	Gentian,	Pennsylvania.
Brockman, Martin Wm.,	Aloes,	Pennsylvania.

Name.	*Subject of Thesis.*	*State.*
Brown, Walter Eugene,	Vanilla,	Delaware.
Cameron, John Henry,	The Thyroid Gland,	New Jersey.
Cherry, Frances (Miss)	Opium,	Pennsylvania.
Chisholm, Jesse Connor,	Sodii Hyposulphis,	Texas.
Closson, Charles Steinmetz,	Why Syrups Spoil,	New Jersey.
Coombs, Harry,	A Practical Soap Cutter,	Colorado.
Crouse, Eugene Drake,	Chloroform,	New Jersey.
Davis, Elizabeth (Miss)	Mentha Piperita,	Pennsylvania.
Davis, Horace Tracy,	Coloring Agents in Pharmacy,	Pennsylvania.
Davis, John Simmonds,	Solution of Hydriodic Acid,	Pennsylvania.
Davis, Thomas Carroll,	Succinic Acid and the Succinates,	Pennsylvania.
Dittmeyer, Walter Eugene,	The Thyroid Gland and its Preparations,	W. Virginia.
Doherty, William John,	Belladonna,	Pennsylvania.
Dulin, William,	Petrogen,	Pennsylvania.
Eberly, John Shelly,	Cascara Sagrada,	Pennsylvania.
Fox, Jamella (Miss)	Acidum Citricum,	Pennsylvania.
Free, William H., Jr.,	Bases for Iodine Ointment,	Pennsylvania.
Fricke, Charles B.,	Pharmacognostical Notes,	Nebraska.
Fuller, Royston Tupper,	Gelsemium,	Nova Scotia.
Garvey, James Aloysius,	Salicylic Acid,	Pennsylvania.
Gemmill, Clarence F.,	Manufacture of Tablets,	Pennsylvania.
Gillan, James Dunlap,	Caroid,	Pennsylvania.
Grier, Robert,	Compressed Tablets,	New Jersey.
Hastings, Lorne Edward,	Saccharin,	Canada.
Hay, Stacey Merritt,	The Production of Borax,	Pennsylvania.
Hibbs, William Buckman,	Camphora,	Pennsylvania.
Jones, Levi W. S.,	Opium,	Pennsylvania.
Jones, Robert Earl,	Immunity,	Ohio.
Keeley, Henry Edgar F.,	Some Disadvantages of Compressed Tablets,	Pennsylvania.
Kilion, Rebecca E. (Miss)	Digitalis,	Pennsylvania.
Klotz, Luther Wenner,	Cryptogamous Plants.	Pennsylvania.
Klucher, John Albert,	Cinchona,	Pennsylvania.
Knouse, Ralph Edward,	Extemporaneous Capsule Filling,	Pennsylvania.
Kopp, Yocum Andrew,	Charta Sinapis,	Pennsylvania.
Kumpf, George Brenner,	Fixed Oils,	Pennsylvania.
Lafean, Wilbur LeRoy,	Stains for Pathological Work,	Pennsylvania.
Lauter, Mary Jenny (Miss)	Antitoxin,	Pennsylvania.
Lewin, Richman Garrison,	Formaldehyde,	Texas.
Lithgow, William David,	Ichthyol,	Pennsylvania.
Long, Henry Clay, Jr.,	Chloretone,	Delaware.
Long, Michael Richard,	Quercus,	Ireland.
Lovatt, James Sidney,	Pepper,	New Jersey.
McCausland, Alexander N.,	Vanilla Grass,	Pennsylvania.
McDevitt, William,	Natural and Synthetic Salicylic Acid,	Pennsylvania.
Mauger, John Harvey,	Convallaria Majalis,	Pennsylvania.

Name.	*Subject of Thesis.*	*State.*
Montgomery, John S., Jr.,	Estimation of Guaiacol in Creosote,	Georgia.
Miller, LeRoy, P. C.,	Assay of Extractum Nucis Vomicæ,	Pennsylvania.
Moore, Wilbert Jacob,	Salicylic Acid and its Action on Fermentation,	New Jersey.
Moore, Julius Shepherd,	Ginseng,	Arkansas.
Morgan, Matthias Drostan,	Formaldehyde,	Pennsylvania.
Moul, William Edward,	Dentifrices,	Pennsylvania.
Neiler, William Mackie,	Vaccine,	Pennsylvania.
Nofer, Walter Washington,	The Manufacture of Corks,	Pennsylvania.
Outerbridge, John W. P.,	Bermuda Arrow Root,	Bermuda.
Peiffer, Irwin Isaac,	A Study of the Micro-organisms in Deteriorated Kino Preparations,	Pennsylvania.
Pereira, David da Salva,	Value Determination of Drugs and their Preparations,	Dutch Guiana.
Quinn, Joseph Aloysius,	Vaccine and Antitoxins,	Pennsylvania.
Renshaw, Milli. S. (Miss),	Boiling Points,	Pennsylvania.
Rider, Joseph Albert,	Should a Pharmacist be a College Graduate?	Pennsylvania.
Robeck, Walter Henry,	Malt Extract, its Preparation and Analysis,	Maryland.
Rohrbaugh, Milton E.,	Crystallization,	Pennsylvania.
Ross, William Smith,	Ointment Vehicles,	New York.
Shafer, Frederick William,	Radium,	New Jersey.
Sharadin, Ralph Clarence,	Cod Liver Oil and its Adulterations,	Pennsylvania.
Shelly, John Culp,	Camphora,	Pennsylvania.
Shull, David Franklin,	Petroleum,	Pennsylvania.
Siegrist, George Anthony,	Hypericum Perforatum,	New York.
Spangler, Harry Albert,	Galla,	Pennsylvania.
Stonesifer, Howard A.,	Modern Pharmacy,	Pennsylvania.
Strunk, Edward Josiah,	Olea Volatilia,	Pennsylvania.
Stump, Frank Arthur,	Emulsions,	Pennsylvania.
Wachtel, Leo Michael,	Cyrilla Racemiflora,	Georgia.
Wagner, George Frederick,	Sodii Bicarbonas,	Pennsylvania.
Walter, Charles Arthur,	Rhus Glabra,	Pennsylvania.
Warshawsky, Reuben,	Urine Analysis,	Russia.
Weinberg, Charles B.,	The Opium Habit,	New Jersey.
Wertz, Harry Elmer,	An Examination of Various Pilocarpus Leaves,	Pennsylvania.
West, David MacGowan,	Sodii Boras,	Pennsylvania.
Zeledon, Jose Antonio,	Copal and Chirraca,	Costa Rica.

Following are the names of those receiving the degree of Pharmaceutical Chemist (P. C.), together with the subjects of their theses:

Name.	*Thesis.*	*State.*
Crafts, Frederick J.	Strophanthus Microscopically.	Ohio
Curtis, Luther Barker	The Commercial Production of Turpentine	Florida
Duncan, Chester Arthur.	Acetic Acid	Pennsylvania

Name.	*Subject of Thesis.*	*State.*
Schmidt, Frank Louis	Sodium Phosphate	W. Virginia
Turner, Thomas Jefferson	Nitroglycerin	Pennsylvania

The following members of the class were awarded the certificate of Proficiency in Chemistry:

Carwithen, Albert States	Pennsylvania
Gehringer, Edwin Franklin	Pennsylvania
Hirst, Ralston Sanford	New Jersey
Hoffman, Norman Boore	Pennsylvania
Keller, Charles Franklin	Ohio
Wyckoff, Elmer E.	Pennsylvania

There were one hundred members of the graduating class, and they represented various States and several foreign countries as well.

Prof. Joseph P. Remington, Dean of the Faculty, announced that the president's cup, offered first by President Howard B. French, in 1901, for high class average, had been won by the present class. The following members of the Class received the grade of distinguished: Thomas Carroll Davis, Charles B. Fricke, Millicent Saxon Renshaw, Walter Henry Robeck, Frank Louis Schmidt; and the following that of meritorious: Samuel Young Althoff, Jesse Connor Chisholm, Elizabeth Davis, Walter Eugene Dittmeyer, Clarence Franklin Gemmill, John Swift Montgomery, William Frederick Shafer, Harry Elmer Wertz.

Hon. George D. McCreary made the valedictory address, and, among other things, said: "You are living in an age in which there are new conditions, new chances and new opportunities for original research. There are great chances for you if you will put into effect what you have learned from your alma mater. Unless you use your knowledge wisely and get out of the beaten track, instead of following the line of least resistance, you will be mere machines all your lives, and will not gain the success you are all looking for. The twentieth century wants original knowledge. New men with new ideas will come on to take the place of those who have made the nineteenth century what it was."

AWARD OF PRIZES.

THE PROCTER PRIZE, a gold medal and certificate, offered for the highest general average, with a meritorious thesis, was awarded to Millicent Saxon Renshaw, Howard B. French making the presentation.

THE WILLIAM B. WEBB MEMORIAL PRIZE, a gold medal and certificate, offered by Mrs. Rebecca T. Webb, for the highest general average in the branches of committee, operative pharmacy and specimens, was awarded to Harry Elmer Wertz, the presentation being made by William J. Jenks. The following graduates received honorable mention in connection therewith: Samuel Young Althoff, Charles B. Fricke, Millicent Saxon Renshaw.

THE PHARMACY PRIZE, a gold medal, offered by Prof. Joseph P. Remington, for original pharmaceutical work, was awarded to John William Pearman Outerbridge, with honorable mention of Millicent Saxon Renshaw and David da Salva Pereira.

THE PHARMACOGNOSY PRIZE, a Zentmayer microscope, offered by Prof. Henry Kraemer, for original research in pharmacognosy, was awarded to Irwin Isaac Peiffer, the following graduates receiving honorable mention in connection therewith: Samuel Young Althoff, Charles B. Fricke, Wilbur LeRoy Lafean, Alexander Newton McCausland, John William Pearman Outerbridge, Harry Elmer Wertz.

THE MATERIA MEDICA PRIZE, $25, offered by Prof. Clement B. Lowe, for the best examination in materia medica, and in the recognition of materia medica specimens, with a meritorious thesis, was awarded to Millicent Saxon Renshaw, the following graduates receiving honorable mention in connection therewith: Charles B. Fricke, Clarence Franklin Gemmill, Irwin Isaac Peiffer, Frank Louis Schmidt, Howard A. Stonesifer, Harry Elmer Wertz.

THE ANALYTICAL CHEMISTRY PRIZE, $25, offered by Prof. Frank X. Moerk, for the best work in qualitative and quantitative analysis, was awarded to Thomas Carroll Davis, with honorable mention of Jesse Connor Chisholm and Elizabeth Davis.

THE MAISCH PRIZE, $25 in gold, offered by Mr. Jacob H. Redsecker, of Lebanon, Pa., for histological knowledge of vegetable drugs, was awarded to Walter Eugene Dittmeyer, Prof. Henry Kraemer making the presentation. The following graduates received honorable mention in connection therewith: Harry Coombs, Clarence Franklin Gemmill, Millicent Saxon Renshaw, Walter Henry Robeck.

THE OPERATIVE PHARMACY PRIZE, $20 in gold, offered by Prof. Joseph P. Remington, for the best examination in operative pharmacy, was awarded to George Brenner Kumpf, the presentation being made by James T. Shinn. The following graduates received honorable mention in connection therewith: Samuel Young Althoff, Eliza-

beth Davis, Charles B. Fricke, Roy Tupper Fuller, William David Lithgow, Michael Richard Long, James Sidney Lovatt, William Edward Moul, Irwin Isaac Peiffer, Millicent Saxon Renshaw, Leo Michael Wachtel, Harry Elmer Wertz.

THE THEORETICAL PHARMACY PRIZE, a Troemner agate prescription balance, offered by Mr. Mahlon N. Kline, for the best examination in theory and practice of pharmacy, was awarded to Jesse Connor Chisholm. The following graduates received honorable mention in connection therewith: Samuel Young Althoff, Thomas Carroll Davis, Jamella Fox, Wilbur LeRoy Lafean, John Swift Montgomery, Millicent Saxon Renshaw, Walter Henry Robeck, Frank Louis Schmidt.

THE COMMERCIAL TRAINING PRIZE of $20 in gold, offered by Prof. Joseph P. Remington, for the best examination in commmercial training at the final examination for the degree, was awarded to John Swift Montgomery, and presented by Prof. E. Fullerton Cook The following graduates received honorable mention in connection therewith: Samuel Young Althoff, William Frederick Bee, Jesse Connor Chisholm, Harry Coombs, Charles B. Fricke, James Aloysius Garvey, Clarence Franklin Gemmill, Walter Eugene Dittmeyer, Lorne Edward Hastings, Robert Earle Jones, Rebecca E. Kilion, William D. Lithgow, Frank Louis Schmidt, John William Pearman Outerbridge, Millicent Saxon Renshaw, Milton Eugene Rohrbaugh, Edward Josiah Strunk, Leo Michael Wachtel.

THE INSTRUCTORS' PRIZE, $20, offered by the instructors of the College for the highest term average in the branches of pharmacy, chemistry and materia medica, was awarded to Charles B. Fricke, Prof. F. P. Stroup making the presentation. The following graduates received honorable mention in connection therewith: Thomas Carroll Davis, Millicent Saxon Renshaw, Frank Louis Schmidt, Harry Elmer Wertz.

THE PHARMACY QUIZ PRIZE, one year's membership in the American Pharmaceutical Association, offered by Prof. Charles H. LaWall, for the best term work in theory and practice of pharmacy, was awarded to John Swift Montgomery. The following graduates received honorable mention in connection therewith: Thomas Carroll Davis, Charles B. Fricke, Frank Louis Schmidt, William Frederick Shafer, Millicent Saxon Renshaw, Harry Elmer Wertz.

THE KAPPA PSI FRATERNITY PRIZE, $20 in gold, offered by the

Eta Chapter of the Kappa Psi Fraternity to the graduate making the highest general average during the three years' course at the College, was awarded to Millicent Saxon Renshaw, Dr. Adolph W. Miller making the presentation.

COMPLIMENTARY SUPPER GIVEN BY THE FACULTY.

On Wednesday evening, April 13th, a complimentary supper was tendered the graduating class by the members of the Faculty. The supper was given in the Museum of the College, and among the invited guests were some of the officers and members of the College. Professor Remington acted as toast master, and short speeches were made by members of the Faculty, the Instructors, officers of the College, and by a number of the graduating class.

BACCALAUREATE SERMON.

Baccalaureate services were held in Christ Church, Second Street above Market, on Sunday, April 10th, the sermon being delivered by the rector, Rev. C. Ellis Stevens, LL.D., D.C.L.

ALUMNI ASSOCIATION.

The annual reunion and banquet of the Alumni Association was held at the Colonnade Hotel on Tuesday evening, April 12th. There was a large number of members in attendance, and remarks were made by representatives of the several classes dating back to 1842, Wm. J. Jenks, second vice-president of the class, responding for this class. Mr. Thomas S. Wiegand, of the class 1844, who has usually been present on these occasions, was not able to be with the alumni, owing to illness, and a committee was instructed to frame a letter to him expressing the sympathy of those present and wishing him a speedy recovery.

The fortieth annual meeting of the Alumni Association was held in Alumni Hall, Monday afternoon, April 11th, at 2.30 P.M., with the President, Albert Oetinger, in the chair.

First in order was the annual address of the chairman, after which reports from the other officers and standing committees were received. The annual election was then held and resulted in the choice of the following officers: President, Walter A. Rumsey; Vice-Presidents, Freeman P. Stroup and John D. Burg; Recording Secretary, Joseph W. England; Corresponding Secretary, Charles H. LaWall; Treasurer, C. Carroll Meyer; Board of Directors,

John W. Fry, Florence Yaple, Otto W. Osterlund, Willard R. Graham, Edward A. Eyer and Clayton E. Morgan.

The annual reception given by the association to the members of the graduating class was held the evening of the same day, in the College Museum, with President Oetinger in the chair. After the roll call of new members elected during 1903-04, an address was made by Prof. Clement B. Lowe.

The prizes offered by the Association were awarded as follows:

THE ALUMNI GOLD MEDAL for the best general average for the year was awarded to Millicent Saxon Renshaw, and presented by Walter A. Rumsey.

THE ALUMNI PRIZE CERTIFICATES, offered for the highest general average in Pharmacy, Chemistry, Materia Medica, Committee, Operative Pharmacy, Analytical Chemistry and Specimens were respectively awarded as follows, Prof. E. Fullerton Cook making the presentation: Jesse Connor Chisholm, Frank Louis Schmidt, Millicent Saxon Renshaw, William Dulin, George Brenner Kumpf, Thomas Carroll Davis and Harry Elmer Wertz.

THE ALUMNI SILVER MEDAL was awarded to George Mahlon Beringer, Jr., for the best general average in the second year examination, Prof. Freeman P. Stroup making the presentation.

THE ALUMNI BRONZE MEDAL was awarded to Herbert D. Flack, for the best general average in the first year examination, and was presented by Prof. Charles H. LaWall.

The Class Oration was delivered by Chester Arthur Duncan; the Class Poem by Reuben Warshawsky; the Class History by Wm. David Lithgow, and the Horoscope of the Class by Charles Arthur Walters.

EXAMINATION QUESTIONS.

The following is a copy of the questions given to the students of the third year class at their recent final examinations. Practical examinations were given in Operative Pharmacy and Analytical Chemistry, and these were held in the respective laboratories. Specimens for identification were given in connection with the written examination in each branch:

THEORY AND PRACTICE OF PHARMACY.

A—Opium.—(1) Why does the U. S. Pharmacopœia direct Opium to be made by incising the unripe capsules of the Poppy plant? (2) Name four principal alkaloids obtained from Opium? (3) What two natural acids are found

in Opium? (4) What is the object of deodorizing Opium? (5) Why is Morphine Acetate an undesirable salt? (6) How is Extract of Opium made? (7) How much Extract of Opium, assaying 20 per cent. of morphine, can be made from 1,000 grammes of Opium assaying 12 per cent.?

B—Give the unabbreviated official names of the following and also give the proper abbreviation for shop furniture labels: Compound Tincture of Lavender, Coxe's Hive Syrup, Mercury with Chalk, Cold Cream, Honey of Rose, Donovan's Solution, Brown Mixture, Basham's Mixture, Easton's Syrup, Lime Water, Blue Mass, Milk of Almond, Basilicon Ointment, Fowler's Solution, Colophony, Griffith's Mixture, Glyconin, Brandy, Hoffmann's Anodyne, Chalk Mixture.

C—(1) Give the characteristic color tests for the following: Salicin, Colchicine, Strychnine, Veratrine, Brucine. (2) Describe the thalleioquin test for quinine. (3) How can you get a rose-colored liquid in making this test?

D—(1) What is an antitoxin? (2) How is diphtheria antitoxin prepared? (3) How is it standardized? (4) What is the theory of the action of diphtheria antitoxin? (5) Why is it put up in hermetically sealed packages? (6) How is it administered?

E—(1) What is glass chemically? (2) From what is "green" glass made? (3) What is used to give an amber color to glass? (4) What is used to give a blue color to glass? (5) How are glass bottles molded? (6) What plan is used to make the letters on a glass bottle stand out sharply? (7) What is the best material from which to make ointment jars? (8) What is the best shape for a shelf ointment jar? (9) What is the best kind of an ointment box for dispensing? (10) Describe metallic tubes for dispensing ointments. What are their advantages?

F—(1) What is the Latin name for the class "Plasters?" (2) What two principal *official* vehicles are used in making plasters? (3) What constitutes a rubber-base plaster mass? (4) Describe briefly the method used in making rubber-base plasters. (5) Describe briefly the hand apparatus used by druggists in spreading plasters for stock or in quantity. (6) Make a sketch of a plaster for the left ear. (7) Make a sketch of a breast plaster.

G—(1) What is an emulsion? (2) What is the theory of emulsification? (3) What is meant by the Continental method? (4) What is meant by the English method? (5) What is meant by Forbe's method? (6) How can you tell when an emulsion is cracked? (7) What causes emulsions to crack? (8) How may you recover a cracked emulsion? (9) How are emulsions made on the large scale?

H—Incompatibility.—(1) Define the term. (2) What three kinds of incompatibility may be recognized? (3) Define each kind. (4) Give an example of each. (5) What rule should govern, when the dispenser is in doubt about filtering a prescription? (6) What is the proper procedure upon receiving a prescription known to contain a dangerous quantity of a poisonous substance?

I—Legislation.—(1) What is the prime object of pharmacy laws? (2) What is an *ex post facto* law? (3) Why is there not a United States pharmacy law? (4) Why should all fees be paid to the State and the Boards of Pharmacy be paid salaries? (5) What are the requirements with regard to the sale of poisons in your State?

K—Fill up three of the labels upon the sheet attached, writing suitable

directions for the following prescriptions : Cod-Liver Oil emulsion for a child ten years old, Fowler's Solution for a man, and Wine of Iron for a woman.

Then write three prescriptions upon the blanks printed upon the label sheet, for the following. numbering and dating each : (1) Twelve powders for a child six years old, suffering from mild indigestion and diarrhea caused by eating unripe fruit. (2) One for an old lady requiring a tonic, containing Quinine, Iron Phosphate and Elixir of Orange (teaspoonful dose, 8 ounce mixture). (3) One metric prescription for a man thirty years old, requiring a suppository containing Extract of Stramonium, Goulard's Extract and Creosote (twelve suppositories).

Write labels for the prescriptions above, and also for the following:

Upon labels for Nos. 4, 5, 6, 7 and 8 (see below), write brief directions for use—pills, ointment, drops, etc. (4) One for a simple ointment, ½ ounce, to apply for a slight eruption on the face, due to sunburn. (5) One for drops for inflamed eyes, 1 fluid ounce solution. (6) One for twelve tablet triturates, in screw-cap vial, for headache due to over-study. (7) One for a pint bottle containing Lime Water. (8) One for two dozen capsules of Phenacetin and Salol, 2½ grains each.

Fill in the address tag for one of the patients, using any name or address.

Fill in the check-blanks in lower left-hand corner for one of the patients.

CHEMISTRY.

A—(1) Describe Acidum Tartaricum and Acidum Citricum, and state how you would distinguish between them. (2) Give an account of the sources and method of production of each of these acids. (3) Give the formulas of several official salts of each acid.

B—(1) Write the structural formulas of Benzene, methyl-benzene and dimethyl-benzene. (2) What is the action of chlorine upon methyl-benzene under different conditions? Illustrate by the formulas of the products obtained. (3) What is the product of the action of concentrated sulphuric acid upon benzene? (4) What of the action of nitric acid? (5) Write the reaction in each case.

C—(1) What is the proper chemical name for aniline, and how is it formed? Write the formulas of the salts it forms with hydrochloric and sulphuric acids, respectively. (2) Write the structural formula of acetanilid, state how it is made and give the official tests for it. (3) Write the formulas of Diphenylamine and Metaphenylenediamine. (4) Do you know any characteristic reaction of either?

D—(1) Describe common Phenol, state how it is made synthetically and what are its official tests. (2) What is the structural formula of acet-paraphenetidin, and what is its medical name? (3) Guiacol is the monomethyl ether of pyrocatechin; write its structural formula. (4) What is the main source of Guaiacol?

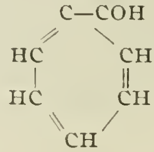
E—(1) What would be the proper chemical name of salicylic acid? Write its structural formula. (2) Write the formulas of neutral and basic sodium salicylate, respectively; of methyl salicylate and of phenyl salicylate. (3) Anisic acid is the methyl ether of p-oxy benzoic acid. Write its structural formula.

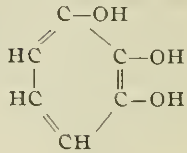
F—(1) Describe Acidum Gallicum, and state the sources from which it is obtained. (2) Write the formula of bismuth monogallate and state its use in

pharmacy. (3) How is tannic acid related to gallic acid? (4) By what tests can the two be distinguished?

G—(1) Give the exact chemical names and, when official, the official names of the following compounds:

$$\begin{array}{l} CH_3 \\ | \\ CO \\ | \\ CH_3 \end{array} \qquad \begin{array}{l} CH_3 \\ | \\ CO{-}O\,C_2H_5 \\ \\ \\ \end{array} \qquad N(CH_3)_4I$$





H—(1) Write the structural formulas for: Amyl nitris, Nitroglycerin, Sodii sulphocarbolas, Thymol, Resorcin, B-naphtol.

I—Food Adulteration.—(1) State the adulterations which are to be looked for in a sample of olive oil and the tests by which you would recognize them. (2) By what test would you distinguish between a genuine butter and oleomargarine? (3) How would you test a sample of milk for purity?

K—Proximate Organic Analysis.—(1) Given spirits of turpentine adulterated with petroleum benzin; state how you would determine the amount of adulteration. (2) Given a linseed oil adulterated with mineral oil and rosin oil; state how you would proceed to analyze it.

MATERIA MEDICA.

A—Jalap.—(1) State its official and botanical names, natural order and habitat. (2) What per cent. of resin should it yield? how is this resin obtained? what are its solubilities in ether and its chief constituent? (3) What is the action of the drug and in what doses is it given? What used to be prescribed under the name of "Rush's thunderbolt?" (4) Does worm-eaten jalap yield a greater or less per cent. of resin? (5) Should it be used for making official preparations?

B—Alkaloids.—(1) Give the botanical names of the plants from which the following are derived, viz.: Coniine, Berberine, Brucine, Sparteine, Nicotine, Physostigmine, Theobromine, Hyoscine, Atropine, Gelsemine, Pilocarpine, Aconitine, Emetine, Hydrastine, Cocaine. (2) Which of these is used as a mydriatic, which as a myotic, which stimulates the sweat glands, which will produce clonic convulsions, which acts as an emetic, which as a local anæsthetic?

C—Purgatives.—(1) Name the purgative principle present in each of the following drugs, viz.: Mandrake, Culver's Physic, Euonymus, Aloes, Senna, Ficus, Elaterium, Manna, Bitter Apple, Bryony. (2) Give the ordinary dose of any five of the above.

D—N. O. Umbelliferæ.—(1) Name the inflorescence and fruit which are characteristic of this order. (2) Give the official names of four fruits, the official names of the volatile oils yielded by these fruits and the doses and medicinal properties of the oils. (3) Name an official fruit derived from this order whose active constituent is an alkaloid and state its action. (4) Give official names of resins derived from this order. Which of these yields a sulphuretted volatile oil?

E—Synonyms.—(1) Give the principal synonyms of the following, viz.:

Marrubium, Iris, Eupatorium, Leptandra, Euonymus, Pyrethrum, Pimenta, Myristica, Capsicum, Sumbul, Absinthium, Hedeoma, Matricaria, Cypripedium, Inula, Eriodictyon, Aspidosperma, Frangula, Oleum Tiglii, Oleum Erigerontis.

F—Official Names.—(1) Give the official names of the following, viz.: Monkshood, Yellow Jasmine, Garlic, Foxglove, Deadly Nightshade, Mandrake, Pokeroot, Butternut Bark, Cascara Sagrada, Henbane, Jamestown-weed, Broom, Pleurisy Root, Oil of Sweet Birch, Bloodroot. (2) Which of these acts as a heart tonic, which as a heart depressant (sedative), which as an expectorant, which as laxatives, which as cerebral depressants?

G—Cinchona Bark.—(1) Name the botanical sources, habitat and countries from which our present supplies are obtained. (2) What do we mean by the terms "natural," "mossed" and "renewed" barks? (3) What per cent. of alkaloids does the latter often yield, name the principal constituents, state their medicinal properties, what name is applied to the effect produced by overdoses and what are these effects?

H—Doses.—(1) State the largest single dose which you would give of each of the following, viz.: Opium, Codeine, Morphine, Heroin, Strychnine, Atropine, Pilocarpine Hydrochlorate, Apomorphine Hydrochlorate, Caffeine, Hyoscine Hydrobromate, Cocaine Hydrochlorate.

I—Toxicology.—(1) Give the chemical antidotes and physiological antagonists for poisoning by the following drugs, viz.: Opium, Strychnine, Aconite, Belladonna, Chloral Hydrate.

K—Emergencies.—(1) What do we mean by the terms "incised wound," healing by "first intention," "healing by granulation"? (2) Briefly outline your method of treating (antiseptically) a scalp wound. (3) In hemorrhage from an artery at what point would you apply pressure to control bleeding? at what point in hemorrhage from a vein?

COMMITTEE.

A—Foxglove.—(1) Give the botanical name and natural order. (2) From what countries is the commercial supply of this drug usually obtained? (3) Describe the general appearance of the drug microscopically. (4) Name three official preparations of the drug. (5) What are their respective uses in medicine? (6) Name the active principles of Foxglove. (7) Is it safe to prescribe either of these principles? if not, why not?

B—Give the unabbreviated official or Latin name, ingredients, brief outline of process, and describe the appearance of the following: Prussic Acid, Lugol's Solution, Labarraque's Solution, Elixir of Vitriol, Plummer's Pills, Carron Oil, Strengthening Plaster.

C—If you were consulted by a physician and asked to suggest the best methods or recipes (pharmaceutically) for administering the following medicines to the sick, by the mouth, what would you advise? (One or two for each substance may be given.) (1) Chloroform. (2) Quinine Sulphate. (3) Tincture of Ferric Chloride. (4) Castor Oil. (5) Potassium Iodide. (6) Strychnine Sulphate. (7) Silver Nitrate. (8) Pumpkin Seed.

D—Doses and Antidotes.—Give the maximum single doses of each of the following: (1) Atropine Sulphate. (2) Extract of Nux Vomica. (3) Codeine Sulphate. (4) Tincture of Hyoscyamus. (5) Diluted Hydrocyanic Acid. (6)

Morphine Sulphate. Also give physiological antagonist and antidote. (7) Extract of Aconite. Also give physiological antagonist and antidote. (8) Strychnine Sulphate. Also give physiological antagonist and antidote. (9) Corrosive Sublimate. Also antidote. (10) Fowler's Solution. Also antidote.

E—Fehling's Solution.—(1) What is Fehling's Solution? (2) Under what title is this solution to be found among the volumetric solutions of the U.S.P.? (3) Give the approved method of keeping this solution, and state your reasons for the procedure. (4) What is the equivalent of 1 c.c. of the solution in terms of glucose? (5) How is Fehling's Solution to be used for the gravimetric estimation of glucose? (6) What is the ratio between the weighed cupric oxide and glucose? (7) How would you prepare a specimen of urine in order to test it for glucose?

F—Acetic Acid.—(1) What is the commercial source of Acetic Acid? (2) How is the crude product purified? (3) Name five official acetates. (4) Give the chemical formulas for each. (5) Explain the conditions favoring the acetous fermentation.

G—Give the unabbreviated official names and proper abbreviations for shop furniture labels for the following: Bromide of Potash, Saltpetre, Calomel, White Arsenic, White Vitriol, Copperas, Sal Soda, Glauber's Salt, Yellow Prussiate of Potash, Rochelle Salt, Cream of Tartar, Liver of Sulphur, Litharge, Sugar of Lead, White Precipitate, Red Precipitate, Tartar Emetic, Burnt Alum, Hypo, Kermes Mineral

H—Criticise the following prescriptions. Write out, with English names, the ingredients and quantities. Would there be any chemical action? State how you would compound them, or what course you would pursue. Give the meaning of any marks or numbers on the margins:

℞	Tr. Ferri Chlor.	
	Tr. Opii Camph.	
Ng	Tr. Lavand. Comp.	āā f℥ ss
	Mist. Cretæ q. s. ad	f℥ iv

Sig.—A teaspoonful 3 times a day.
March 20, '04. M. P.

℞	Sodii Bicarb.	ʒ iij
	Sodii Borat.	ʒ ij
	Acid Carbolic	fʒ ss
LX	Glycerini	f℥ i
	Aquæ q. s. ft.	Oss

Sig.—Apply as directed.
March 22, '04. V. K.

I—Would you compound the following prescriptions as written? What course would you pursue? Write out, in English, the correct translation of ingredients and quantities:

℞ Antipyrin
Chloral Hydrate āā 2 gm.
Ft. chart. No. X.
Sig.—Add one powder to a tablespoonful of water and take as required. C. W.

℞ Pulv. Rad. Belladon. gr. ss
Flor. Benzoes
Tannin Pur. āā gr. i
Sacch. Alb. q. s.
M. ft. pulv. d. t. d. No. XX.
Sig.—Every morning and evening 1 powder to be taken. G. D.

K—Criticize the following prescriptions. (1) How would you compound them? (2) Does reaction take place between the ingredients? If so, what? (3) Are they safe to dispense? If so, how? (4) Would you put a poison label on the bottles? (5) Translate, writing out the quantities and ingredients in English, also the signa.

For Baby Maud.
℞ Potass. Cyanid. gr. i
Acid. Citric gr. ij
Syr. Tolut. q. s. ft. f℥ij
Ft. mist.
Sig.—Half a teaspoonful when cough is troublesome. A. T.

℞ Potass. Chlor. ʒi
Acid Mur. fʒss
Aquæ q. s. ft. f℥vi
Ft. solutio sec. art.
Sig.—Use as directed. P. D. H.

COMMERCIAL TRAINING.

A—Ordering Goods.—Write out an order upon Thomas Jackson, Son & Co., Wholesale Druggists, New York City. You are not known to them, but have good credit. Be careful to use proper forms, abbreviations and details. Select any ten articles that you would be apt to need in the retail drug business, each representing a different class of goods—say, one chemical, one drug, one fluid extract, one kind of soap, one kind of hair-brush, etc. Write the order in such a form that the drug house would not be in doubt on any single point. Fold the order properly, place it in an envelope, addressing it correctly and indicate where the stamp should be placed. Do not fold.

B—Business Letter.—Write a model letter, containing about 100 words, asking for a position. Address it to either a retail druggist, manufacturer or wholesale house who may have a vacancy. Give such information about yourself as you think would be useful and would impress the firm with the desirability of securing your services. Fold the letter properly and place it in an envelope correctly addressed. Do not seal. (Two envelopes are furnished for question B. Why?)

C—Banking.—(1) What is the principal object of a bank? (2) What is meant by a bank check? (3) How do banks make money? (4) What is a clearing house? (5) What is the object of identifying a depositor? (6) What is the name of the clerk who receives your deposit? (7) What is the name of the person who cashes checks? (8) What is meant by "discounting" a note? (9) What is the object of drawing a check

"to order?" (10) Name some of the expedients used to protect the drawer of a check from loss through what is known as "raising" a check. (11) When a check is drawn to your order with your name improperly spelled, what is the proper course to pursue? (12) Draw a check upon the College House Bank for $26.76, using the blank furnished and omitting no necessary detail, $50 being the balance on deposit before the drawing of the check.

D—Insurance.—(1) Define insurance. (2) Name four kinds of insurance in common use. (3) What is meant by an "Endowment Policy?" (5) What is meant by "reinsurance?" (6) Why are Assessment Life Insurance Companies unsafe ventures? (7) Why is a relatively large premium demanded from an old man? (8) What is meant by an annuity policy? (9) Define "beneficiary."

E—Partnership.—(1) Define partnership. (2) Give reasons for the necessity of care in selecting a partner. (3) Is each partner liable for obligations contracted by one of the others? (4) Why should one partner be delegated to sign all checks? (5) What is the danger to the business if a partner endorses an accommodation note?

F—Mercantile Agencies.—(1) Define the object of a mercantile agency. (2) Why should proper information be given to them? (3) How does such an agency derive its support?

G—Mailing.—(1) What constitutes a proper package for small articles to be sent by mail? (2) Where should the postage stamps be placed upon paper boxes sent by mail? (3) What is necessary to secure the return of a package wrongly addressed? (4) What advantages are there in sending packages by letter postage? (5) What advantage is there in sending an advertising circular by letter postage? (6) How may money be safely sent by mail? (7) What is meant by "registering" a letter, and what are its advantages?

H—Definitions.—Define the following terms: (1) Mortgage. (2) Lease. (3) Deed. (4) Draft. (5) Invoice. (6) Letter of credit. (7) Certified check. (8) Judgment note. (9) Codicil. (10) Wild-cat money.

I—Card Indexes.—(1) Describe the card-index system for general purposes. (2) How may such a system be used in bookkeeping for the retail drug business? (3) What is the advantage of the use of rods, and what is the best form of rod?

J—Business Law.—(1) Define "days of grace." (2) Is a signature written with lead-pencil good at law? (3) What is meant by "binding the bargain?" (4) Why should checks be presented for payment soon after their receipt? (5) Why is a promissory note given in a gambling transaction void? (6) What is meant by "statute of limitation?"

ANALYTICAL CHEMISTRY.

I. (*a*) Describe the determinations of Mg and SO_4 in Magnesium Sulphate. (*b*) If 1 gramme of material yields 0·148 Magnesium Pyrophosphate and 0·311 Barium Sulphate, what is the per cent. of crystallized Magnesium Sulphate?

II. (*a*) Describe the estimation of Urea. (*b*) Write the reaction showing the decomposition of Urea. (*c*) What is the per cent. of Urea in a specimen of urine if 4 c.c. (sp. gr. 1·024) yield 20 c.c. gas? (*d*) Why is no correction for temperature necessary in this determination?

III. (*a*) Describe four tests which will distinguish between Brucine and

Strychnine. (*b*) Describe four tests which will distinguish between Morphine and Quinine.

IV. (*a*) Give the classification of Volumetric Solutions depending upon chemical changes in their use. (*b*) Classify the Volumetric Solutions which you have used. (*c*) Give two illustrations of a direct and of a residual titration.

V. How would you estimate, volumetrically, the following substances, giving names of the Solutions, Indicators, End Reaction and Molecular Ratio between the substance and the Volumetric Solution.

(*a*) Phosphoric Acid. (*b*) Sodium Chloride. (*c*) Arsenous Oxide.
(*d*) Sodium Thiosulphate. (*e*) Phenol.

VI. Describe fully the volumetric estimation of (*a*) Sodium Carbonate. (*b*) Ferrous Sulphate.

VII. Describe fully the volumetric estimation of Calcium Hypophosphite.

VIII, IX, X. Practical laboratory work in the determination of the following: Sodium Carbonate, Ferrous Sulphate, Calcium Hypophosphite.

MINUTES OF ANNUAL MEETING.

The annual meeting of the Philadelphia College of Pharmacy was held on March 28, 1904, at the College building, 145 N. Tenth Street.

Twenty-six members were present, the President, Howard B. French, presiding. The minutes of the quarterly meeting, held December 28, 1903, were read and approved. The minutes of the meetings of the Board of Trustees for December 1, 1903, January 5 and February 2, 1904, were read by the Registrar, J. S. Beetem, and approved.

The annual meeting being the occasion for the reports of the officers and standing committees, these were given in the following order:

President's Report.—Mr. French stated, among other things, that: "The walls and ceilings of the chemical laboratory had been repaired and painted and the seats repaired and put in order. Some changes were made in the heating and lighting plant, which have proved satisfactory and of material advantage to the College. During the coming summer it will be necessary to make some material changes in the electric light wiring system in order to increase its efficiency. Other necessary repairs have been made, so that the entire property is in fairly good condition. The debt of the College has been reduced during the year, and the Treasurer will commence the next fiscal year (from May 1st) with a better balance than last year. For the term 1903–04 there is an increase in the number of students over the preceding year, and in individual

instruction in the laboratories and special courses a gratifying increase is noted. The course in Commercial Training is an obligatory course for the third year students and is again strongly commended, as it is deemed of inestimable value to the students. During the term two Junior students have died. Seven active members have been added to the College membership, and eight have been elected associate members. There have been two deaths.

"Arrangements are being made to lengthen the course of instruction, and it is anticipated that one week will be added to the first year course, two weeks to the second year course, and four weeks to the third year course. It is suggested that the extension of time for the third year classes shall be largely utilized for instruction in food adulterations, which will place the graduates in position to examine food products, not only to the credit of their profession, but to their advantage financially.

"The suggestion in last year's report regarding a post-graduate course is renewed as of so much importance to be kept in mind by the Committee on Instruction. This special instruction, it is hoped, will open the way to extend the laboratories to provide for special instruction, such as analyses of water, iron and steel products, gas, sugar, cement, etc. In one line in particular, that of cement, the field is unusually wide, and the demand for expert chemists in this line largely unfilled and constantly increasing.

"The Historical Committee have been actively at work, and have secured information which is very desirable to preserve. They have also succeeded in gathering together many articles of historical value, and it will be necessary in the near future to provide cases in the Museum for their protection and exhibition.

"In closing, the President desires to express his commendation of the work of the Alumni Association and of all those actively connected with the work of the College."

Historical Committee.—George M. Beringer, the chairman, reported as follows: "During the year a beginning has been made upon the collection of data and such information, records and materials obtainable, relating to the history of pharmacy. A card catalogue has been prepared, containing the names of all the graduates of the College now living. A circular letter has been prepared and sent to each graduate, soliciting answers to the queries and such additional information as could be supplied. A great many have re-

sponded, but quite a number have not yet been heard from, and it will be necessary to continue the correspondence. Papers and notes of especial interest and historic value have been received from thirty-two (32) persons, and donations for the Historical Section of the Museum have been received from fifteen persons."

Committee on Publication.—Prof. Samuel P. Sadtler, the chairman, reported that THE AMERICAN JOURNAL OF PHARMACY had been issued regularly during the year; the number of unsold volumes on hand was estimated at about 1,875, covering the period from 1829 to the present time.

The members of the College were requested to be on the lookout for back volumes previous to and including 1876, particularly the four preliminary numbers published previous to 1829, and the volumes for 1829, 1830, 1831, 1833, 1834, 1835, 1842, 1846, 1847, 1856, 1865. The committee acknowledged their indebtedness to Mr. Wm. McIntyre for the first two volumes (1829 and 1830); the Morris Perot Estate for a number of volumes, including several of the rare ones; Dr. Susan Hayhurst for quite a number of volumes; Messrs. Seabury & Johnson, of New York, for some recent back numbers, and to Mr. M. I. Wilbert for having secured several of the earlier and more rare volumes.

The editor's report was read by Prof. Henry Kraemer. On motion of Professor Remington, it was ordered that so much of the report as the editor might select be published in the JOURNAL (p. 223).

The report of the Committee on Pharmaceutical Meetings was read by Professor Remington: "During the past year the meetings have been held regularly, and have been of professional and practical interest. Much of the time has been devoted to discussions following the reading of the papers. The minutes of the meetings have been published regularly in THE AMERICAN JOURNAL OF PHARMACY, and reports of the meetings have been sent to various of the drug journals, and in some cases to the daily papers. It is proposed to consider some of the legal, ethical and professional problems which confront the pharmacists at succeeding meetings, and members are urged not only to attend the meetings, but to bring forward suggestions whereby the conditions of pharmacy may be improved."

Librarian's Report.—Owing to the illness of the librarian, Mr. Wiegand, the report was not presented, but it was stated that during the past year 108 volumes of theses had been bound.

Curator's Report.—Joseph W. England reported: "The Museum is in good condition and has received a number of contributions during the year. The collection of official drugs and preparations in the students' reading-room is likewise in good order, and is daily studied by the students with interest and profit. The need of additional shelf-room grows more imperative, especially in view of the recent addition by the Historical Committee."

The following-named gentlemen, proposed for honorary membership at the quarterly meeting in December, were then balloted for and unanimously elected:

Prof. Dr. Julius Wiesner, of Vienna.

Prof. Dr. A. E. Vogl, of Vienna.

Prof. John J. Abel, Johns Hopkins University.

Prof. W. G. Farlow, Harvard University.

Mons. Eugene Léger, Paris.

Mons. Prof. Emil Bourquelot, Paris.

Mons. Alf. Riche, Paris.

Mons. Eugène Collins, Paris.

Mons. Prof. Guignard, Paris.

The president appointed the following as delegates to the Pennsylvania Pharmaceutical Association for the meeting to be held at Cambridge Springs, June 21st–23d: H. L. Stiles, W. L. Cliffe, Joseph W. England, Mahlon N. Kline and C. A. Weidemann.

Announcement was made of the death of Mr. Frank Luerssen, at Salem, N. J., on January 6, 1904. He was elected a member of the College in 1897.

The annual election being next in order, Wallace Procter and C. Carroll Meyer were appointed tellers, who, after a ballot, reported the unanimous election of those proposed by the Committee on Nominations, as follows:

President, Howard B. French; First Vice-President, William J. Jenks; Second Vice-President, R. V. Mattison, M.D.; Treasurer, James T. Shinn; Corresponding Secretary, A. W. Miller, M.D.; Recording Secretary, C. A. Weidemann, M.D.; Curator, Joseph W. England; Librarian, Thomas S. Wiegand; Editor, Henry Kraemer; Trustees, Samuel P. Sadtler, Wm. L. Cliffe and Joseph L. Lemberger. Publication Committee: Henry N. Rittenhouse, Samuel P. Sadtler, Wallace Procter, Joseph W. England, Henry Kraemer, Joseph P. Remington and Martin I. Wilbert. Committee on Phar-

maceutical Meetings: Henry Kraemer, Joseph P. Remington, C. B. Lowe, M.D., William L. Cliffe and William McIntyre.

C. A. Weidemann, M.D., *Secretary.*

PHARMACEUTICAL MEETING.

The seventh of the series of pharmaceutical meetings of the Philadelphia College of Pharmacy for 1903–04, was held Tuesday afternoon, April 19th, with Dr. C. A. Weidemann in the chair.

William A. Selser, a well-known apiarist, of Jenkintown, Pa., was the first speaker on the programme, and read a paper on "The Origin and Formation of Honey and its Relation to the Polariscope," which will be published in the June issue of this Journal. Mr. Selser made the statement that while there are a number of methods for the detection of adulteration in honey, yet the results obtained by means of the polariscope are the only ones that can be relied upon with certainty.

Mr. E. M. Boring referred to a paper which appeared in this Journal some years ago, and in which the claim was made that honey kept in the light will crystallize, whereas if kept in the dark it will remain fluid. Apropos of this statement, Mr. Selser said that all pure honey will crystallize or "candy" in time. He said that in order to preserve it in a fluid condition it should be kept thoroughly quiet and at an even temperature. He further stated that honey as capped in the cells of the hive is practically free from air and will not crystallize, unless the hives be moved, so as to cause injury to the caps; and also that in the bottling of honey it is necessary to use a wax which is air-tight. In reply to a question by Mr. W. A. Rumsey in regard to the use of water for liquefying crystallized honey, Mr. Selser said that its use was unnecessary, and that if the honey were carefully heated it would liquefy.

Dr. Lowe brought up the question of poisoning by honey, and in the discussion of this subject Mr. Selser stated that in the cases on record of which he was aware, it appeared that it was the comb which contained the poison rather than the honey itself.

A. Augusto, an Italian pharmacist of Philadelphia, read an interesting paper on "The Italian Olive Oil on the American Market." (See page 219.) An instructive feature of the discussion on this paper was the denial by Mr. Augusto of the statement current for

many years that large quantities of cotton-seed oil are exported to Italy from this country and returned to us as olive oil. He said that cotton-seed oil is generally used by the Italians for burning in their lamps, it being free from odor. According to Mr. Augusto, when a good olive oil is burned there is no odor, but if a second-quality oil be used, the odor is quite disagreeable. Another point, which was emphasized by Mr. Augusto, was the fact that the so-called Italian olive oil on the American market is manufactured in New York. Professor Kraemer confirmed this statement by referring to a bulletin recently issued by Dr. Wiley, of the U. S. Department of Agriculture, in which he showed that the so-called olive oil on our markets is a product due to the genius and skill of certain manufacturers in New York.

In view of the statement made by Mr. Augusto in regard to the testing of the oil, namely, that the tester must be familiar with the genuine product in order to judge of the quality of a sample, Professor Kraemer remarked that one would be inclined to look upon the usual tests as more or less fallacious. He then referred to the practice of testing teas, wines, etc., by means of the senses, and also to the fact that this is one of the methods employed by the U. S. Department of Agriculture for testing tobaccos.

M. I. Wilbert, Ph.M., presented a paper entitled, "The Pharmacist and the Pharmacopœia," in which he traced the evolution of the U. S. Pharmacopœia and the several dispensatories. (See page 203.)

J. W. P. Outerbridge, P.D., a recent graduate of the college, exhibited and described a prescription file of his own devising. (See page 221.)

Mr. Boring said that he used a device somewhat similar, that is, a perpendicular wire, but that he used clothes-pins for shoving the prescriptions up and down. Mr. Wilbert said that at the German Hospital it was desirable to refer to the prescriptions on file frequently and rapidly, and that he had found a box-file having two horizontal wires, so that the prescriptions hang on the wires, adapted to this purpose. When referring to the prescriptions the arrangement is such that the prescriptions stand in place, and those ahead can be turned down, thus facilitating the work.

George E. Outhette exhibited a typewriting machine manufactured by the Blickensderfer Manufacturing Company, and adapted for writing labels.

FLORENCE YAPLE,
Secretary pro tem.

THE AMERICAN
JOURNAL OF PHARMACY

JUNE, 1904.

THE FORTHCOMING PHARMACOPŒIA.

By Joseph P. Remington.

While it is too soon to review in advance the Eighth Decennial Revision of the United States Pharmacopœia, in detail, the interest in this edition has been so widespread, and the inquiries about the changes have increased to such an extent, that it seems only right to give to the pharmaceutical profession information about the most salient features. The work is now being printed and, if no unforeseen accident occurs, it will be ready in October. For the first time in the history of Pharmacopœial revision in the United States the work is being revised under the control of a chartered organization. As is well known, previous revisions were conducted by a body known as the Committee of Revision, which had entire charge of the work, including the sale of the book and the control of the finances. Owing to the immense increase in what are known as new remedies within the last ten years, and the greatly enlarged scope of the work of revision, it was deemed best in 1900 to relieve the distinguished Chairman, Dr. Charles Rice, of part of his burden by separating the financial and commercial duties from the work of revision, and to place under his leadership the important duty of preparing the manuscript and the other work in charge of a Board of Trustees. To accomplish this, a charter for the United States Pharmacopœial Convention was granted on the 7th day of July, 1900, in Washington, by the District of Columbia. By this charter, the objects above outlined were secured, and thus the whole work of revision has been given a legal and official status, which remedied a fundamental need demonstrated by previous revisions.

Interest in the forthcoming revision has been enhanced by the Food and Drug Laws of the various States, and the legislation in Congress which claimed the attention of the country at the recent session. One of the serious criticisms of the Pharmacopœias of 1880 and 1890 was that in many cases the requirements, notably in the chemical products, were entirely too stringent; absolute purity in medicinal chemicals is unnecessary, and the standards were found to be in some instances impossible of fulfilment, unless the cost of the product was increased to such an extent as to make it an uncommercial article.

On the other hand, the presence of impurities which would interfere with therapeutical action was to be carefully guarded against. The Convention of 1900 adopted the following general principles:

"The Committee is instructed to revise as carefully as possible the limits of purity and strength of the pharmacopœial chemicals and preparations for which limiting tests are given. While no concession should be made towards a diminution of medicinal value, allowance should be made for unavoidable, innocuous impurities or variations due to the particular source or mode of preparation, or to the keeping qualities of the several articles."

To carry out this direction, the Committee of Revision has adopted what has come to be known as the "Purity Rubric." This will be one of the features of the new book, and will be placed immediately under the official title and English name of the article. It will declare the percentage of the pure substance and the limit of innocuous impurity permitted, but will not prevent the sale of the absolutely pure article, or that of a higher grade, if any pharmacist chooses to use such. But it must be understood that the so-called "impurities" are innocuous, and this is controlled by chemical limitation tests, which exclude likely impurities of a harmful character.

The introduction of methods of assay for a number of drugs, the quality of which can be controlled in this way, will mark another advance by the forthcoming Pharmacopœia, the number of assay processes having been largely increased.

Another new feature will be the introduction of doses. This subject occupied the attention of previous Conventions for a number of years. The introduction of doses was opposed mainly by the physicians of previous Conventions, chiefly for the reasons that it was

impossible to fix upon single quantities as doses, because of the idiosyncrasies of patients, and the danger of prosecution and liability to needless annoyances in prescribing through the limitations thus placed in a work of authority like the Pharmacopœia. If maximum doses were inserted, the physician who ordered a dose in excess of the quantity would be called up by the dispenser, or he would be required in every case to indicate by underscoring, or some similar method, that a dose above that directed by the Pharmacopœia was intended. On the other hand, pharmacists greatly desired the maximum dose inserted, in order to relieve them of the responsibility of determining whether a dose was excessive or dangerous. But in the Convention, the views of the pharmacists prevailed, but it was necessary to avoid maximum or minimum doses, and insert an average dose, as will be seen by the following instruction to the Committee of Revision:

"After each pharmacopœial article (drug, chemical, or preparation) which is used or likely to be used internally or hypodermically, the committee is instructed to state the average approximate (but neither a minimum nor a maximum) dose for adults, and, where deemed advisable, also for children. The metric system to be used, and the approximate equivalent ordinary weights or measures inserted in parenthesis. It is to be distinctly understood that neither this Convention nor the Committee of Revision created by it, intends to have these doses regarded as obligatory on the physician, or as forbidding him to exceed them whenever in his judgment this seems advisable. The committee is directed to make a distinct declaration to this effect in some prominent place in the new Pharmacopœia."

The question of nomenclature is always an important part of pharmacopœial revision. Conservatism here is very desirable. Change merely for the sake of change should be avoided, and it is gratifying to report that this principle is being observed in the present revision. No change is likely to be adopted without strong reasons. Difficulty has been encountered in selecting names for the synthetic remedies, a number of the prominent ones having been admitted, and although the use of long chemical names has been discouraged, in a very few cases it has been impossible to avoid introducing such.

The use of synonyms has been discouraged, and this is in accord with the general principle of placing in the Pharmacopœia prepara-

tions which can be controlled by standards or an official description, and leave no room for evasion. This will require more care on the part of physicians in writing their prescriptions. The extension of the list of synonyms, particularly with pharmaceutical preparations, will often prove a hardship to the druggist. If, for instance, Turlington's Balsam is recognized as a synonym for compound tincture of benzoin, any druggist selling Turlington's Balsam not made strictly by the new Pharmacopœia, will be liable to prosecution, and the sale of Turlington's Balsam made by any other process would invite prosecution. Care in the selection of synonyms is, therefore, very important. One of our Judges in a Western court decided that a grocer who made essence of lemon by a process other than that of the U.S.P., 1890, although it yielded a finer product, was liable to damages, and he was accordingly mulcted. This was due to the fact that the U.S.P., 1890, inserted as a synonym under Spiritus Limonis the words "Essence of Lemon." This will be controlled in the new Pharmacopœia by inserting the following declaration:

"The standards of purity and strength prescribed for any article in the text of this Pharmacopœia are intended to apply to such article only when used for medicinal purposes, and when professedly bought, sold, or dispensed as such."

Again, much annoyance has been experienced through the requirement of pharmacopœial standards when applied to articles used for technical purposes or in the arts, as in the case of muriatic acid and similar products. It is a manifest absurdity to apply pharmacopœial standards to such products.

The subject of weights and measures has attracted some attention recently, and the introduction of alternative quantities into the Pharmacopœia has been advocated by some writers. There may be, of course, two opinions upon this subject, but the instructions of the Pharmacopœial Convention are mandatory, and the President of the Convention has sent to the pharmaceutical journals the following communication:

To the Pharmaceutical and Medical Professions of the United States:

So many communications have been received, either through the mail or through the columns of various pharmaceutical journals, by the Board of Trustees of the U. S. Pharmacopœia, concerning the introduction of alternative formulæ into the Parmacopœia, and so wide a misunderstanding apparently exists concerning the functions of the trustees, that it seems necessary, as

President of the U. S. Pharmacopœial Convention, that I should explain the situation to the pharmaceutical and medical public.

The organization which has been provided for the production of the new U. S. Pharmacopœia consists of the Pharmacopœial Convention, which meets every ten years, in which all authority exists, and from which any right to act is derived. By the Convention are appointed the Board of Trustees and Committee of Revision.

Chapter IV, Article 2 (Abstract of Proceedings of the U. S. Pharmacopœial Convention), states that the "Board of Trustees shall have the management and control of the affairs and funds of this Convention, except as herein otherwise directed," and then continues in detail to direct that the trustees shall transact financial and other allied business; whilst Chapter V, Article 2 (abstract of Proceedings of the U. S. Pharmacopœial Convention), puts the whole preparation of the manuscript of the Pharmacopœia directly under the exclusive control of the Committee of Revision.

It is plain that the Board of Trustees can therefore act only after the Committee of Revision shall have made its report, and that the only function that it has in regard to the manuscript itself is to see that it has been prepared in accordance with the directions of the Convention.

Whether it is wise to introduce into the formulæ of the U. S. Pharmacopœia alternative quantities, is a question well worthy of discussion and of solution. It is plain, however, that the settlement of matters of such primary importance in the Pharmacopœia naturally belongs to the Convention and not to a Committee, and the Convention very properly took action in this matter in 1900. The action taken may or may not have been the best possible, but the right and power of the Convention to act is unquestionable.

Section 7, page 30 (Abstract of Proceedings of the U. S. Pharmacopœial Convention), says in regard to the formulæ: "The Committee (of Revision) is *instructed* to retain the metric system of weights and measures as adopted in the *Seventh Decennial Revision*." The word used in the text is not "advised" or "recommended," but "instructed," and for one or both of the subordinate bodies of the Convention to absolutely disregard the instructions of the Convention, would be a direct breach of faith, and would establish a most disastrous precedent, which would destroy the confidence that any future convention might have in the carrying out of its instructions by its appointed Committee of Revision. Such a precedent might well undermine the whole fabric of Pharmacopœial Revision.

In order to guard against such a calamity, Chapter 5, Article 2, of the Abstract of Proceedings of the U. S. Pharmacopœial Convention, expressly states that the "Committee of Revision shall execute such orders or resolutions as shall have been assigned to it by the Convention." Certainly the duty of obedience could not be more fully formulated.

The U. S. Pharmacopœia has, by the Acts of Congress and of various State Legislatures, been given in the United States the force of law, and it behooves a law-making body to adhere in the closest manner possible to the rules of parliamentary procedure, much more to those of ordinary good faith; so that the question as to whether alternative quantities shall or shall not be used in the formulæ of the U. S. Pharmacopœia is a matter of little importance compared with the question whether the Board of Trustees and the Committee of Revi-

sion shall or shall not comply with the instructions of the body to whose action they owe their existence, and whose mandates they were created to put into execution.

While the process of revision has been actively progressing, an important movement for an International Pharmacopœia of potent remedies met in Brussels in 1903, and drew up a schedule of strength for "Medicaments Heroique." As it is most desirable that the United States Pharmacopœia should act in harmony with this body, and thus in time bring about international uniformity, the strengths of some of the important galenical and pharmaceutical preparations in the new Pharmacopœia will be changed, for instance, tincture of aconite will be reduced to 10 per cent. in strength, syrup of ferrous iodide will be reduced one-half to 5 per cent., while other minor changes will be made. The International Congress adopted the standards of the United States Pharmacopœia for arsenical liquids, namely, 1 per cent.

In conclusion, it may be said of the new Pharmacopœia that while it contains a number of what may be called innovations, these have not been inserted without weighty reasons, and for the purpose of representing the spirit of progress which must ever remain the principal reason for revision. A consideration of the amount of labor made necessary by the principles above outlined should go far to account for the delay of one year in issuing the book.

SOLUTION OF CHLORINATED SODA.

By H. V. Arny and J. F. Wagner.

Noting that samples of this official solution prepared by the class in practical pharmaceutical chemistry invariably proved deficient in chlorine when assayed, the writers undertook an investigation of the causes leading to this deficiency, the object first sought being to learn whether the manufacture of the small quantity assigned to each student (100 grammes finished solution) was a source of error, whether the manufacture of 1,000 grammes would yield a stronger product.

A preliminary analysis of the method of the Pharmacopœia of 1890 revealed at least one fault to which deficiency of chlorine content of the finished product is due.

The Pharmacopœia of 1890 demands that 75 grammes chlorinated lime, containing not less than 35 per cent. available chlorine, should yield 1,000 grammes of solution, containing at least 2·6 per cent. chlorine. The 75 grammes chlorinated lime is supposed to contain 26·25 grammes chlorine ($75 \times 0·35$). and this volatile body is supposed to be held during the entire intricate process prescribed by the Pharmacopœia, resulting in a finished product containing 26 grammes of the 26·25 grammes of available chlorine found in the original lime. How well this is accomplished the figures given below well show.

The very volatility of the available chlorine in the preparation under discussion precludes the manufacture of the solution by the process of 1890 with a loss so small as that just given. The loss of chlorine by volatilization is known to all, but the following figures express the fact still more strongly:

	Per Cent. Cl.
Solution of chlorinated soda, assayed on day of manufacture . .	1·89
" " " " two days after " . .	1·87
" " " " one week " " . .	1·72

The point may be raised that a minimum of 35 per cent. available chlorine is demanded by the Pharmacopœia of 1890, and that the use of a stronger chlorinated lime will insure full strength Labarraque's solution.

But is it a simple matter for the retail pharmacist to secure full strength chlorinated lime?

Stevens (Proc. Mich. Ph. Assn., 1897, p. 42, through Proc. A. Ph. A.) reports an examination of thirty-two samples, with results showing chlorine strength varying from less than 1 per cent. to 31 per cent.

Puckner (Proc. Ill. Ph. Assn., 1897, p. 70, through Proc. A. Ph. A.) reports on ten samples, showing that bulk chlorinated lime varied from 31·5 per cent. to 34·6 per cent. available chlorine, while that in packages ranged from less than 1 per cent. to 23·65 per cent.

Even the firm of Squibb, so noted for careful selection of the best in the drug line, makes no pretenses of furnishing lime of Pharmacopœial strength, labeling their product, "32 per cent. to 35 per cent. available chlorine." And it might be added that the two samples of chlorinated lime used in the following experiments were Squibb products; yet both assayed under 30 per cent. available chlorine, thus showing that a marked deterioration had occurred during the time it was in the jobber's hands.

And yet the retailer is supposed to take a chlorinated lime; macerate with three successive portions of water, with no especial care to either obtaining a definite quantity of filtrate or of insuring complete exhaustion of the lime; treat the filtrate with warm sodium carbonate solution; warm the mixture, if gelatinous; and, finally, filter; to do all this in open vessels and still get a finished filtrate containing 26 of the 26·25 grammes of chlorine supposedly contained in the original substance.

Verily, this result is what our German friends would call "fast quantitativ," and is on a par with the ease and simplicity (theoretical) of the Pharmacopœial method of making spirit of ammonia and with the airy directions given for making the official iodized sulphur.

Perhaps some hair-splitting chemist, by some miracles of chemical manipulation, may secure perfect results from the Pharmacopœial methods of making the three substances just cited; but it is the opinion of the writers that these methods are far beyond skill of the retail pharmacist for whom the recipes are originally intended.

Let us give figures obtained in the manufacture and assay of several lots of Labarraque's Solution by the process of 1890, and let it be explained that we will, in the tabulated statements, make use of the following abbreviations:

Labarraque = Solution of chlorinated soda.
Lime = Chlorinated lime.
Hypochlorite Sol. = Solution of chlorinated lime, the intermediate product in the method of the U.S.P., 1890, for making Labarraque.
Lime residue = The chlorinated lime supposedly exhausted with water by the process of 1890.

In the first two experiments, having previously found the lime deficient in chlorine, the amount of that chemical employed in the process was increased in direct proportion to its chlorine deficiency, with a view to start with same amount of chlorine demanded for official chlorinated lime. This necessitated addition of extra sodium carbonate to insure complete precipitation.

The titration, as mentioned above, was performed by the method of the U.S.P., 1890, adding potassium iodide and hydrochloric acid to a definite quantity of the solution and titrating the liberated iodine against decinormal sodium hyposulphite V. S.; starch mucilage being used as the indicator. In the following tables this volumetric solution is abbreviated to $\frac{N}{10}$ Thio.

Experiment A.—Method, U.S.P., 1890; 100 grammes. Used 10·1 grammes lime containing 26 per cent. Cl = 26·26 grammes Cl. Obtained 80 c.c. hypochlorite solution, 100 grammes Labarraque, —— grammes lime residue.

6·74 gms. Labarraque required	38·3 c.c. $\frac{N}{10}$ Thio, equalling	0·13935	gms. Cl.
10· " Labarraque required	56·8 " $\frac{N}{10}$ Thio, equalling	0·2009	" "
Average 10 gms. " contained	. . . .	0·200895	" "
6·74 gms. hypochlorite sol. req'd.	54·1 c.c. $\frac{N}{10}$ Thio, equalling	0·19135	" "
Average 10 gms. " " contained	. . . .	0·28384	" "
Whole lime residue required . .	77·8 c.c. $\frac{N}{10}$ Thio, equalling	0·27517	" "

CONCLUSIONS.

The lime contained	2·626	gms. Cl.
" hypochlorite solution contained		
" Labarraque contained	2·0089	" "
" lime residue "	0·27517	" "

Experiment B.—Method, U.S.P., 1890; 1000 grammes. Used 101 grammes lime containing 26 per cent. Cl = 26·26 grammes Cl. Obtained 530 c.c. hypochlorite solution, 1000 grammes Labarraque, —— grammes lime residue.

6·74 gms. Labarraque required	39·4 c.c. $\frac{N}{10}$ Thio, equalling	0·3935	gms. Cl.
10· " " "	58·5 " $\frac{N}{10}$ Thio, equalling	0·2069	" "
Average, 10 gms. Labarraque contained	. . . .	0·206825	" "
" 1000 " " "	. . . .	20·6825	" "
6·74 gms. hypochlorite sol. req'd	74·6 c.c. $\frac{N}{10}$ Thio, equalling	0·26386	" "
10· " " " "	110·7 " $\frac{N}{10}$ Thio, "	0·39156	" "
Average, 10 gms. " " contained	. . . .	0·39151	" "
Total lime residue required . .	— c.c. $\frac{N}{10}$ Thio, equalling	——	" "

CONCLUSIONS.

The lime contained	26·26	gms. Cl.
" hypochlorite solution contained	——	" "
" Labarraque contained	20·6825	" "
" lime residue "	——	" "

It will be noticed that the figures in the two experiments just given are incomplete; because the work was merely preliminary.

They are given, however, because they show that the addition of an extra amount of chlorinated lime does not raise the chlorine value of the finished Labarraque to the normal, even when the increase in amount is directly proportionate to the deficiency in the chlorine strength of the lime.

Finding this plan of making up the deficiency of commercial chlorinated lime unavailing, and choosing as our main object a demonstration of the loss of chlorine in each of the three stages of the 1890 method, in future experiments with the process of 1890, we employed the pharmacopœial amount of chlorinated lime—75 grammes to 1000 grammes finished solution. Thus we try to show what would result in the manufacture of Labarraque by a retail pharmacist who uses the best chlorinated lime offered him in the open market.

In most of the experiments the same lime was employed, it being titrated from time to time to notice loss of chlorine on standing, the exact chlorine strength being indicated in each case.

Experiment C.—Method, U.S.P., 1890; 100 grammes. Used 7·5 grammes lime containing 28·8 per cent. Cl = 2·16 grammes Cl. Obtained 42 c.c. hypochlorite solution, 97 c.c. (100 grammes) Labarraque, —— grammes lime residue.

1 c.c. Labarraque required	5 c.c. $\frac{N}{10}$ Thio, equalling	0·017685	gms. Cl.
5 c.c. " "	25·1 c.c. $\frac{N}{10}$ Thio, "	0·887787	" "
Average, 10 c.c. Labarraque contained	. . . .	0·1772	" "
" 97 c.c. " "	. . . .	1·7188	" "
5 c.c. hypochlorite sol. req.	59·3 c.c. $\frac{N}{10}$ Thio, equalling	0·209744	" "
42 c.c. " " contained	. . . .	1·761849	" "
Whole lime residue required	53·6 c.c. $\frac{N}{10}$ Thio, equalling	0·18958	" "

CONCLUSIONS.

The lime contained	2·16	gms. Cl.
" hypochlorite solution contained	1·76	" "
" Labarraque contained	1·7188	" "
" lime residue "	0·1895	" "

Experiment D.—Method, U.S.P., 1890; 1000 grammes. Used 75 grammes lime containing 28·3 per cent. Cl = 21·225 grammes Cl. Obtained 450 c c. hypochlorite solution, 1000 grammes (970 c.c.) Labarraque, —— grammes lime residue.

1 c.c. Labarraque required 5 c.c. $\frac{N}{10}$ Thio, equalling 0·017685 gms. Cl.

5 c.c. " " 25·1 c.c. $\frac{N}{10}$ Thio, equalling 0·0887787 " "

Average, 10 c.c. Labarraque contained . . . . 0·1772 " "

" 970 c.c. (1000 gms.) Labarraque contained . . 17·1887 " "

5 c.c. hypochlorite sol. req. 60·3 c.c. $\frac{N}{10}$ Thio, equalling 0·21328 " "

450 c.c. " " contained . . . . 19·1953 " "

Whole lime residue required 363 c.c. $\frac{N}{10}$ Thio, equalling 1·2839 " "

CONCLUSIONS.

The lime contained . . . . 21·2250 gms. Cl.
" hypochlorite solution contained . . . . 19·1953 " "
" Labarraque contained . . . . 17·1887 " "
" lime residue " . . . . 1·2839 " "

Experiment E.—Method U.S.P., 1890; 1,000 grammes. Used 75 grammes containing 28·1 per cent. Cl = 21·075 grammes Cl. Obtained 432 c.c. hypochlorite solution, 1,000 grammes (969 c.c.) Labarraque, 71 grammes wet lime residue.

1 c.c. Labarraque required 5·2 c.c. $\frac{N}{10}$ Thio, equalling 0·0183924 gms. Cl.

5 " " " 26·1 " $\frac{N}{10}$ Thio, " 0·0923157 " "

Average—10 c.c. Labarraque contained . . . . 0·184277 " "

" 969 c.c. (1,000 grammes) Labarraque contained, 17·8564 " "

1 c.c. hypochlorite sol. required 12·2 c.c. $\frac{N}{10}$ Thio, equalling 0·0431514 " "

5 " " " " 61·5 " $\frac{N}{10}$ Thio, " 0·2175255 " "

Average—10 c.c. hypochlorite sol. contained . . . . 0·43328 " "

" 432 " " " " . . . . 18·7176 " "

2 gms. lime residue required 13·4 c.c. $\frac{N}{10}$ Thio, equalling 0·473958 " "

71 " " " contained . . . . 1·6825 " "

CONCLUSIONS.

The lime contained . . . . 21·075 " "
" hypochlorite sol. contained . . . . 18·7176 " "
" Labarraque " . . . . 17·8564 " "
" lime residue " . . . . 1 6825 " "

Thinking that a possible source of chlorine loss in the foregoing experiments might be found in the calcium carbonate precipitate from which the finished Labarraque is filtered, two samples of this were assayed:

Whole precipitate from Experiment C contained but . . . . 0·032807 gms. Cl.
" " " " E " " . . . . 0·10477 " "

The amounts represent, respectively, 1·3 per cent. and 0·4 per cent. of chlorine, with which we began, and show that the washing of the precipitate with the water needed to bring the finished Labarraque to the required weight, if carefully carried out, removes all but the last traces of chlorine.

Therefore, whatever loss occurs during the manufacture of Labarraque's Solution, is due either to retention of chlorine in the chlorinated lime residue or to evaporation of chlorine during the process of manufacture.

Since the process of 1880 prevented, as far as possible, loss by evaporation, experiments were made to see if the process on the whole was superior to that of 1890.

It will be recalled that the U.S.P. of 1880 directs mixing of the chlorinated lime with water in a tightly covered vessel and to the paste is added the sodium carbonate solution and finally sufficient water to bring the mixture to a definite weight. Lastly, the clear solution is syphoned from the precipitate.

By this method loss of chlorine through evaporation is largely avoided, and results given below show the advantage of this precaution. On the other hand the following figures show that the chlorinated lime is poorly extracted, and that this disadvantage outweighs the advantage gained by prevention of evaporation.

Experiment F.—Method of U.S.P., 1880; 1,000 grammes; made from 80 grammes lime containing 28·3 per cent. Cl = 22·64 grammes Cl. From this obtained 759 grammes (724·45 c.c.) Labarraque and 241 grammes moist lime residue:

1 c.c. Labarraque required 6·6 c.c. $\frac{N}{10}$ Thio, equalling	0·02334	gms. Cl.
5 " " " 33·2 " $\frac{N}{10}$ Thio, "	0·1174	" "
Average—10 c.c. Labarraque contained	0·23414	" "
" 724·45 c.c. " "	16·9629	" "
2 gms. lime residue required 11·1 c.c. $\frac{N}{10}$ Thio, equalling	0·03926	" "
241 " " " contained	4·7309	" "

CONCLUSIONS.

The lime contained	22·64	" "
" Labarraque contained	16·9629	" "
" lime residue "	4·7309	" "

Experiment G.—Method of U.S.P., 1880; 1000 grammes. Made from 80 grammes lime containing 28.3 per cent. chlorine = 22·64 grammes Cl. From this obtained 805 grammes (767 c.c.) Labarraque, and 195 grammes moist lime residue.

1 c.c. Labarraque required	6·35 c.c. $\frac{N}{10}$ Thio, equalling	0·022459 gm.	Cl.
5 c.c. " "	31·8 " $\frac{N}{10}$ Thio, "	0·11247 "	"
Average, 10 c.c. Labarraque contained		0·22477 "	"
" 767 " " "		17·2403 gms.	"
2 gms. moist lime residue req'd	12.5 c.c. $\frac{N}{10}$ Thio, equalling	0·04421 gm.	"
195 " " " " contained		4·3102 gms.	"

CONCLUSIONS.

The lime contained	22·64	gms. Cl.
" Labarraque contained	17·2403	" "
" lime residue "	4·3102	" "

Since the process of 1880 seemed to show no chance of variation when manufacturing different quantities, no experiment involving the manufacture of 100 grammes was made.

It will be seen from the two experiments just given that the retention of chlorine by the insoluble lime residue is enough to render the process more wasteful of chlorine than that of 1890. Another objection is found in the uncertainty as to the amount of finished solution; since the lime residue is included in the final weight of the preparation.

The latter disadvantage could be remedied in an ideal recipe by washing the residue with water, sufficient to bring the finished solution to a definite weight. Perhaps such washing may prove successful in removing most of the chlorine from the residue, though the evaporation of chlorine during washing is a factor to be considered.

Experiments based on the lines just suggested are being carried on and will be published, provided the Pharmacopœia of 1900 does not make the much needed change.

CONCLUSIONS.

(1) The process of manufacture of solution of chlorinated soda given by the Pharmacopœia of 1890 will not yield in the hands of the average operator a product of official chlorine strength.

(2) It leads to loss of chlorine, and that at every stage of the operation; part being retained by the incompletely washed chlorin-

ated lime, and part lost by vaporization; this loss being shown, not only in the finished solution, but also in the intermediate product, solution of calcium hypochlorite.

(3) The process of U.S.P., 1880, is even more wasteful of chlorine than is that of 1890. The loss is chiefly from one cause, however—retention of chlorine by the lime residue. The loss by evaporation is much less than in the process of 1890, and altogether it is a more sensible process, the chlorine strength being easily within the limits required by the Pharmacopœia.

(4) While the process of 1880 is more wasteful of chlorine, the finished Labarraque is a stronger body than that yielded by the process of 1890.

(5) A comparison of chlorine loss in the process of the two Pharmacopœias is shown in the following tabulation of experimental data:

U. S. P., 1890.

		Gms. Cl.	Per Cent. of Total Chlorine.
A.	100 gms. Labarraque =	2·0089	
	Lost in lime residue =	·2751	10·4
	" by evaporation =	·3420	13.0
	10·1 gms. lime contained	2·6260	——
	Chlorine loss during entire operation		23·4
C.	100 gms. Labarraque =	1·7188	
	Lost in lime residue =	·1895	8·7
	" by evaporation =	·2517	11.6
	7·5 gms. lime contained	2·1600	——
	Chlorine loss during entire operation		20·3
D.	1000 gms. Labarraque =	17·1887	
	Lost in lime residue =	1·2839	6·05
	" by evaporation =	2·7524	12·96
	75 gms. lime contains	21·2250	——
	Chlorine loss during entire operation		19·
E.	1000 gms. Labarraque =	17·8564	
	Lost in lime residue =	1·6825	7·9
	" by evaporation =	1·5361	6·2
	75 gms. lime contained	21·0750	——
	Chlorine loss during entire operation		14·2

U. S. P., 1880.

F.	759 gms. Labarraque	= 16·9629	
	Lost in lime residue	= 4·7309	20·9
	" by evaporation	= ·9462	4·1
	80 gms. lime contained	22·6400	——
	Chlorine loss during entire operation		25·
G.	805 gms. Labarraque	= 17·2403	
	Lost in lime residue	= 4·3102	19·
	" by evaporation	= 1·0895	4·8
	80 gms. lime contained	22·6400	——
	Chlorine loss during entire operation		23·8

PHARMACEUTICAL LABORATORY,
CLEVELAND SCHOOL OF PHARMACY, April, 1904.

THE ORIGIN AND FORMATION OF HONEY, AND ITS RELATION TO THE POLARISCOPE.

By WM. A. SELSER.

The origin and formation of honey is the result of a combination, and a combination which nothing else can duplicate. (1) The nectar from the plant life. (2) The action of the bee in its own body. (3) Its deposition and evaporation.

No other known sweets that could be gathered by the bee would result in honey, although the two second combinations might be present. For instance, quite a lot of very bad adulteration is palmed off on the public by feeding the bees a dilution of cane sugar. Root (page 200, of the 1903 edition of the *Honey Bee*) states that sugar syrup fed to the bees might be chemically a sort of honey, yet be a fraud on the consumer. I am glad to state it would never be a fraud on the chemist. No adulteration would be easier detected. Then we have again, for the first combination, the honey dew produced by the excretion of a plant louse sprayed, as it were, upon the leaves of the plant, and gathered by the bees. This is not honey, nor could any process by man yet discovered take the first combination, nectar from the plant life, without the agency of the bee and by any chemical manipulation produce honey. We have a very pleasant sweet produced by man from maple nectar boiled down, commonly known as maple sugar.

Like the question once asked: "When a rifle bullet was shot through a board, which went through first—the bullet or the hole?" They naturally go together. So we would answer when asked which would be the most important factor in the production of honey—the nectar or the bee? we would say, they inseparably must go together.

The first combination (nectar) as produced by nature under certain conditions, primarily possibly for the fertilization of the blossom, is a very thin, watery fluid, insipidly sweet, with very little flavor. This fluid is taken into the mouth of the bee and chemically changed, and by the salivary secretion being mixed with the fluid supplied by large glands from the head and thorax, converting this fluid into dextrose and levulose, resulting in a fruit-sugar or honey, then deposited by the bee in the little wax cells and evaporated by the action of the bee's wings under a high temperature about 50 per cent., and then capped over and sealed like a housewife would seal fruit when it is about 75 per cent. or 85 per cent. solid, ripe honey containing on the average about 15 per cent. to 25 per cent. of water.

A great deal of honey is of a poor quality on account of the bee-keeper rushing his product to the market and extracting it before it is thoroughly evaporated. This causes fermentation and destroys both quality and flavor. Formic acid, as made by the bee, makes honey somewhat of an antiseptic, preventing decomposition.

POLARISCOPE.

While there are a number of methods of analyzing honey to determine its adulteration, yet by the aid of the polariscope is the only acknowledged method to-day that has any degree of certainty in its results.

In the bulletin published by the U. S. Department of Agriculture, in the year 1892, Bulletin No. 13, Division of Chemistry, we have a very full and complete result of vast researches in the line of the polariscope work. On page 789 of that bulletin, we have the analysis by the polariscope of honeys that are given at dextro-rotation. This at first might baffle the chemist, but the invert or second reading has classed them in a separate class by themselves.

On page 801 we have the statement that at the present time no genuine samples of honey collected in this country have shown a right-handed rotation; yet the suspicion is thrown out that a honey gathered from the excrescence of the pine tree shows a low right-hand reading, and yet might be classed as pure.

In trying to perfect myself in polariscope work, this thought has been a great bone of contention in all my laboratory work. I visited personally Professor Wiley, chief of the Bureau of Chemistry, and he acknowledged that this was the one great drawback in the positive proof of low reading right-handed honeys. It did not suggest itself at that time, which was about the year 1895, that there was any method by which positive proof could be obtained. In analyzing honey by the polariscope for the Pure Food Inspector of the National Bee-keepers' Association in nearly all the Western States, I never ran across any honey which showed this peculiarity gathered from the excrescence of the pine.

In 1902 a large syrup-packing company of San Francisco shipped to the East several car loads of bottled honey, one car load coming to Philadelphia, and distributed by the commission men to the grocery trade generally. I secured several samples of this honey, and found that it showed under the first reading + 2·5 and under the invert reading — 1·5. I immediately pronounced this as adulterated, and so informed the trade. I had my opinion confirmed by L. F. Kebler, now of Washington, but at that time chief chemist of the Smith, Kline & French Company.

I then went to Washington and had the same sample analyzed in the Department Laboratory; and after a long consultation with Professor Wiley, he distinctly stated that while he felt there was a grave suspicion of adulteration, it could not be proven. In other words, "guilty but not proven." The Professor said it looked to him as if that showed a trace of gathering from the pine of California. I was completely stunned in my opinion at this conference, for I felt that the whole work of the polariscope was uncertain and the whole chain of evidence was only strongest at its weakest link. I immediately came to the conclusion that there was only one positive proof, and that was for a practical apiarist to visit the large apiaries in the United States, wherever practicable, watch what the bees were working on, take the honey out of the hives, and analyze it for the results. I started on a three months' tour, costing me $1,500—visiting the large apiaries of the South and West, going as far as Vera Cruz, Mexico. My closest and most careful observations and samples were from California, as this sample of honey in question was said to come from Santiago County.

All my samples gathered outside of California, except from Mosquoit, in Texas, would show a left-hand first reading of — 8 9,

invert, reading of — 10 and a fraction up. In Santiago County I secured seven samples of the White Sage, the lowest reading being — 12.8; first invert, — 16·6. The highest reading being — 18·7 and — 22 invert. The Black Sage showed a lower reading, — 6·0; second, — 8.3. The Wild Buckwheat, in the hills of Santiago County, showed a reading of — 9 first, — 12 second. The Prune Bloom, near Los Gatos, showed also a low reading of first, — 6·5; invert, — 6·5. Some samples of the Orange Blossom also showed as low a reading as — 5·4, but I found the average of this — 7.

The most important sample secured was from an apiary situated right in the midst of the pine forests in the mountains, to the extreme east of Redlands. This was taken from different hives and showed, first reading, — 14; second reading, — 23·2; but the lot of samples showed an average of the first reading, — 15.

I then felt I had sufficient proof that the parties who had packed this honey had adulterated it, but wanting to exhaust every avenue of proof, I visited San Francisco, staying there a considerable time, employing detectives to visit this large packing house, and I there had sufficient proof to show that cane sugar and glucose had been used in large quantities in their establishment. A most significant fact was, while this packing company wrote to the grocers in the East, positively denying my charges, saying the honey was strictly pure, I never, individually, heard a word further about it, but the very next season I received a sample from this company with the price of the analysis accompanying it, and found the results showed a first reading, — 17; invert, — 21·6, showing that this article was strictly pure, and that they had used honey from an entirely different source from that previousy packed.

On my return the Department of Agriculture wrote me for a copy of my analysis, and I received this extract from the reply of Chief Wiley:

"The remarkable fact is shown by your investigations that even honey gathered in the vicinity of the pine trees is strictly left-handed. The honey still shows the peculiarities that led me to believe it an adulterated or artificial honey, and the result which you have obtained is entirely corroborative of that view. I believe that under pure food laws, a conviction could be had upon the evidence in this case, especially when compared with all the other data of California honeys which you have collected. You certainly have

gone into this in a most painstaking and thorough manner, and deserve the praise of all interested in pure honey for what you have done. You will understand that we place our laboratories always at the service of anyone who is interested in stamping out adulteration in honey, or in foods of any kind.

"Respectfully, (Signed) H. W. WILEY, *Chief.*"

I fully believe that the result of this experiment will enable us to prove before any court of law the adulteration of any honey yet put up in the United States for commercial purposes.

JENKINTOWN, PA.

ELIZABETH MARSHALL, THE FIRST WOMAN PHARMACIST IN AMERICA.

BY M. I. WILBERT,
Apothecary at the German Hospital, Philadelphia.

It may not be generally known that it is now a full hundred years since a woman first presided over an apothecary shop in Philadelphia, and that this, so far as known, was the first pharmacy in America to be so controlled.

The circumstances that led up to the opening of the shop in the modest parlor of the house, then 56 Chestnut Street, were referred to by Mr. Evan T. Ellis, in his story of "A Very Old Drug Store" (A. J. P., 1903, page 57), and will be referred to again, at some length, later on.

Elizabeth Marshall was the oldest daughter and the oldest living child of Charles Marshall, the first President of the Philadelphia College of Pharmacy, or, as it was then called, "The Philadelphia College of Apothecaries." She was born in the house 56 Chestnut Street, old number, on January 28, 1768. As a child she was much in the company of her grandfather, Christopher Marshall, and appears to have been his favorite grandchild, being repeatedly mentioned, in a commendatory way, in the unpublished portions of his diary, now in the possession of the Pennsylvania Historical Society.

Some of the details of the business conducted by Christopher Marshall and his lineal descendants may not be out of place here, despite the fact that much has been but recently told by Mr. Ellis in the paper referred to above.

Christopher Marshall in the early decades of the eighteenth century was one of the very few druggists in Philadelphia. His shop is described by the annalist of the time as being "In a two-storied building with a projecting roof, from which was suspended a large gilded ball." This sign was characteristic of this early shop, which was usually referred to as being "at the sign of the golden ball." In this modest shop, at 46 Chestnut Street, near Second, Christopher Marshall kept on hand such medicinal preparations as were used by the medical men of those days, in their practice, and also sold such household remedies, herbs, spices and tea, as were thought necessary to supply the modest wants of the pioneer residents of Philadelphia.

CHARLES MARSHALL.
The First President of the Philadelphia College of Pharmacy, from a Water-Color in Possession of Charles Marshall, Germantown.

Having amassed what was, at that time, considered to be a liberal competence, Christopher Marshall retired from active business in 1771, and was succeeded by his three sons, Benjamin, Christopher, Jr., and Charles Marshall. The business was conducted at 46 Chestnut Street by Benjamin Marshall & Brothers until the death of the elder brother, Benjamin, in 1778, when the business was continued by Christopher, Jr., and Charles Marshall.

It is probable that this store was one of the first in which physicians' prescriptions were compounded; exactly when this innova-

tion was introduced does not appear, and there is no positive evidence that such is the case. From the fact, however, that Dr. Abraham Chovet, one of the first physicians in this country to write prescriptions, was an intimate friend of the family, particularly of Christopher Marshall and his two remaining sons, it is quite probable that he patronized the store with which they were connected.

The firm gradually increased their business, and besides being importers as well as exporters of all kinds of crude drugs and doing a general wholesale and retail drug business, also ventured into the manufacture of chemicals.

ELIZABETH MARSHALL.
From a Silhouette in Possession of Charles Marshall, Germantown.

This manufactory is referred to, in "Watson's Annals of Philadelphia," as being in "a grim and forbidding-looking building on Third Street near the stone bridge over the Cohocsink." It was generally shunned by the small boy of that period on account of the gruesome tales that had been circulated in connection with it and also on account of the noisome odors that emanated from it at certain times. Christopher Marshall died May 6, 1797, aged eighty-seven years and five months. Shortly after this Charles Marshall retired from active business, retaining, however, a pecuniary interest in the firm.

The unfortunate circumstance that brought disaster to the now aged Charles Marshall is recorded in the biographical sketch by

Dillwyn Parrish (A. J. P., 1865, page 242), as follows: "A few years after his retirement from active business, the establishment, with which his name had been for many years associated, loaned the endorsement of the firm to a large amount, and involved all connected with it in bankruptcy. The senior partner, who was entirely ignorant of these proceedings, was then in advanced life, but met the shock with fortitude and without hesitation gave up his property for the benefit of his creditors.

"This sad occurrence made it necessary to change his manner of life, and in 1804 it was concluded that his daughter Elizabeth, a lady of singular good sense and varied attainments, should open a store and conduct the business of a pharmaceutist, with the aid of her father. The small front parlor of their dwelling, then 56 Chestnut Street, opposite Strawberry Alley, was appropriated to this purpose."

In this connection it may be of interest to note that the name, Elizabeth Marshall, apothecary, does not appear in any of the early directories of Philadelphia; it does appear, however, as a contributor to the Pennsylvania Hospital, in the printed records of that institution.

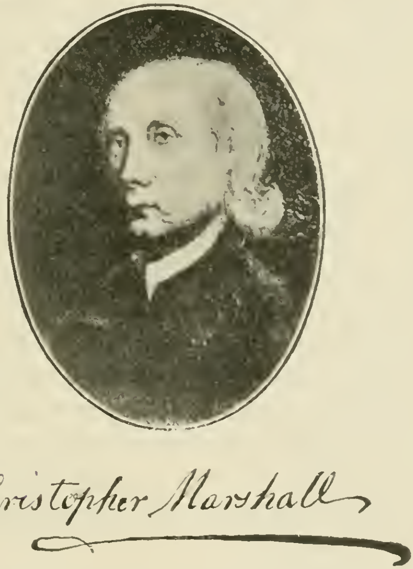
That the store at 56 Chestnut Street was well thought of at the time, would appear from the following quotation, taken from an address by Daniel B. Smith, delivered before the Philadelphia College of Pharmacy, September 24, 1829. (A. J. P., 1829, page 241.)

"Less than thirty years ago almost the only apothecary's shop in Philadelphia, where the physician was sure of obtaining the latest foreign preparations, of having his medicines prepared under the eye of the master and with competent pharmaceutic skill, or in which a strict system of accountability was carried through the details of the shop, was that of Charles Marshall, the first president of this institution."

When we remember that all of the details of this shop were presided over by the daughter, it is indeed a well-merited compliment. From a monetary point of view, the business was successful from the very start. This was, no doubt, largely due to the fact that many of the leading physicians and business men, sympathizing with the misfortune that had come to Charles Marshall, a man well known and greatly admired for his probity and ability, were liberal in their patronage. It was little wonder then that the business grew rapidly, and that the store had to be repeatedly enlarged to meet the constantly-increasing demands for space.

The number of apprentices gradually increased until as many as twelve were employed at one time. Among these early apprentices were some of the most prominent pharmacists of Philadelphia, and it may well be said that all of them, in later years, were grateful indeed for the practical training they received from this skilled and highly efficient woman pharmacist.

In the matter of practical contributions this store was also one of the first to appreciate the necessity of and to provide distinctly American preparations. Many of the preparations now extensively



From a Painting in Possession of Charles Marshall, Germantown.

used originated in this store, and were first made popular as the favorite prescriptions of one or the other of the Philadelphia practitioners of that time. Among the more widely known of these preparations, we may mention brown mixture, the mistura glycyrrhizæ composita of the United States Pharmacopœia. This preparation is said to have originated in this store about 1814, as the favorite prescription of Dr. Benjamin Smith Barton, a well-known American botanist and teacher of materia medica, and the suc-

cessor of Dr. Benjamin Rush as professor of the practice of medicine in the medical school of the University of Pennsylvania.

That Elizabeth Marshall was a good business woman is evident from the fact that the shop over which she presided not alone supplied a suitable living for herself, her father and other members of her family, but also contributed no mean sums to worthy charities, and finally enabled her to retire with a competence after a business career of not more than twenty-two years.

The father, Charles Marshall, died August 22, 1825, in his eighty-second year. Dillwyn Parrish, in his biographical sketch quoted above, gives the following interesting description of him:

"In stature Charles Marshall was about 6 feet high, of slender mould, clear complexion, blue eyes and graced with a benignant expression of countenance, heightened in its effect, toward the end of life, by the snowy whiteness of his hair, which in ample volumes descended nearly to his shoulders. His costume was uniformly plain in color, being the drab then in vogue with the Society of Friends, of which he was a consistent and lifelong member."

Shortly after her father's death Elizabeth Marshall sold out her interest in the store to two of her former apprentices, Charles Ellis and Isaac P. Morris, and retired from active business.

The remaining years of her life were spent quietly, but not idly. One contemporaneous writer says of her: "While life lasted she was devoted to those active, yet unobtrusive duties of benevolence which are the chief ornaments of the Christian character. Even when afflicted by disease she was not unmindful of those who, by vicissitudes incident to man, were made dependent on the hand of charity. She was beneficent and kind to all, and dispensed her charities with a liberal hand."

Another writer says: "The uniform cheerfulness which she displayed under every circumstance evinced that conscious rectitude and peace of mind which ever adorns the Christian."

Elizabeth Marshall died July 26, 1836. The simplicity and purity of her character, coupled with her skill and probity in business, and her benevolence and charity in private life, made her well known and highly respected by all classes of society. But for us, and for future generations, it is her heroic spirit of self-sacrifice, that, above all, is particularly attractive, and makes her worthy of emulation for all times to come.

THE NOMENCLATURE OF THE GLYCEROPHOSPHATE PREPARATIONS.

By Melvin W. Bamford.

At this time, when preparations of the salts of glycerophosphoric acid are attracting considerable attention, it might be of advantage to make an effort to secure some degree of uniformity in the strength and nomenclature of these preparations. Something should certainly be done in this direction because otherwise there appears to be danger that there will be the same confusion with preparations of glycerophosphates as has always existed with preparations of the hypophosphites. With this latter class it has never been possible for a physician to know what would be used in his prescription for compound syrup of hypophosphites, nor for a pharmacist to know just what a physician might mean when he wrote compound syrup of hypophosphites. Under this title we have any number of preparations ranging from one containing only the salts of calcium, sodium and potassium, to one containing iron, manganese, strychnine and quinine in addition to the first three mentioned.

For a parallel case with the glycerophosphates we find, on referring to the price lists of two of the largest manufacturers of pharmaceuticals in the country, that one lists a preparation containing the salts of calcium, sodium, potassium and iron as compound elixir of glycerophosphates, and the other manufacturer under exactly the same title lists a preparation containing calcium, sodium, iron, manganese, quinine and strychnine.

For some reason, which is not altogether apparent, these preparations of the glycerophosphates are only from a half to a third as strong as the preparations of the hypophosphites. The difference in the price of the salts probably has some influence on this, the cost of the glycerophosphates being about three times as high as the cost of the hypophosphites.

Pharmaceutically and medicinally there seems to be no reason why the glycerophosphate preparations should not be made as concentrated as those of the hypophosphites. This is especially apparent when it is considered that Dr. Robin, to whose work these salts in large degree owe their popularity, used a more concentrated solution and in relatively larger doses than is provided for by most of the preparations now on the market. The syrup of Dr. Robin's,

which was his favorite formula, contains approximately 65 grammes of glycerophosphates in 1,000 grammes of syrup, while the U.S.P. syrup of hypophosphites contains 75 grammes in 1,000 c.c., which would make them very nearly equal in total salt content.

Considering that these preparations of the glycerophosphates are nearly all made up with a hydro-alcoholic base and are used largely in nervous disorders, and that their use in some cases is continued for months, it would seem very desirable to administer them in small doses rather than large doses; in other words, to make the preparations more concentrated.

In view of these conditions, the writer has prepared a set of resolutions for your consideration, to be discussed and amended if deemed advisable, which it is hoped will prevent an increase in this confusion, and possibly aid in remedying existing conditions.

RESOLUTION.

Whereas, There seems to be danger that the preparations of the glycerophosphates are getting into the same state of confusion, as to strength and nomenclature, as the preparations of the hypophosphites:

Whereas, There is no apparent reason why the nomenclature and strength of the preparations of the glycerophosphates should not conform with those of the hypophosphites in the United States Pharmocopœia and National Formulary; therefore be it

Resolved, That the assembled members of the Philadelphia College of Pharmacy use their influence toward that end, and do hereby endorse the strength and nomenclature given in the following list of those preparations, which in each case correspond with the preparations of the hypophosphites in the United States Pharmacopœia and National Formulary:

Elixir gycerophosphatum, elixir of glycerophosphates, 1,000 c.c., to represent:

Calcium glycerophosphate	45 grammes.
Potassium glycerophosphate	15 "
Sodium glycerophosphate	15 "

Elixir glycerophosphatum cum ferro, elixir of glycerophosphates with iron, 1,000 c.c., to represent:

Calcium glycerophosphate	25 grammes.
Potassium glycerophosphate	15 "

Sodium glycerophosphate	15 grammes.	
[1] Iron glycerophosphate	10	"

Elixir calcii et sodii glycerophosphatum, elixir of calcium and sodium glycerophosphates, 1,000 c.c., to represent:

Calcium glycerophosphate	35 grammes.	
Sodium glycerophosphate	35	"

Elixir glycerophosphatum compositum, compound elixir of glycerophosphates, 1.000 c.c., to represent:

Calcium glycerophosphate	35 grammes.	
Potassium glycerophosphate	17·5	"
Sodium glycerophosphate	17·5	"
Iron glycerophosphate	2·25	"
[2] Quinine glycerophosphate	1·125	"
[3] Strychnine glycerophosphate	·33	"

THE NESTOR OF CHICAGO PHARMACY.

By Albert E. Ebert.

Ezekiel Herbert Sargent; born at Dover, N. H., November 13, 1830; died at Chicago, April 24, 1904.

Mr. Sargent lived with his parents until six years of age, when he went to live with his half-brother at Lowell, Mass. After eight years of schooling, he was, at the age of fourteen years, apprenticed to the drug business with the firm of Carleton & Hovey, Lowell, Mass., with whom he remained for seven years. Among his clerk associates at this store were Chas. T. Carney, of Boston, Mass.; Henry M. Whitney, of Andover Depot, Mass.; Fred W. Willis and James W. Mill, later of Chicago.

Dr. F. Scammon, one of the pioneer druggists of Chicago, seeking a competent associate in his established drug business, was recommended by Messrs. Cutler Brothers, wholesale druggists, of Boston, Mass., to secure Mr. Sargent for such position. Dr. Scammon invited Mr. Sargent to come to Chicago, which he did, arriving in the early part of 1852. A partnership was formed under the firm name of F. Scammon & Co., consisting of Dr. Franklin Scammon, Myrick L. Scammon and E. H. Sargent, to succeed to the business of F. Scammon, 119 Lake Street, and which had just been removed to its new quarters at 140 Lake Street. Mr. Sargent

[1] This is ferrous lactate in the hypophosphite preparation.

[2] This is quinine hydrochlorate in the hypophosphite preparation.

[3] This is an equivalent quantity of tincture of nux vomica in the hypophosphite preparation.

assumed the general management of the drug business, which at that time was largely wholesale, Mr. Myrick Scammon giving his attention to a side line of the business, consisting of daguerreotype material, and Dr. F. Scammon looking after the manufacture of linseed oil, which was carried on extensively at that time by the firm of Scammon & Haven. The firm of F. Scammon & Co. did a prosperous business, and was continued until 1856, when it was dissolved. Mr. Sargent associated himself with Mr. John C. Ilsley, a clerk of Sears & Smith, under the firm name of Sargent & Ilsley, and they purchased the drug part of the business of F. Scammon & Co., continuing the same at the old stand as a wholesale and retail drug business. The new firm started out with all the prospects of prosperity; times were good and business was good. But soon the financial horizon throughout the United States began to darken, and the panic in the fall of 1857 burst in all its fury over the Northwest, and many of the strongest business firms went to the wall. The young firm struggled on until the fall of 1859, when it was wound up, and the business was sold out to Messrs. Wright & French, formerly of Boston, Mass., who removed the retail part of the business to the northwest corner of Randolph and State Streets, and placed Mr. Sargent in charge of the same. Through his efforts it soon became one of the leading retail drug businesses not only of the city of Chicago, but of the Northwest.

In the summer of 1870, Mr. Sargent purchased the interest of his partners, and became the sole owner of a prosperous business of high reputation, which he had so successfully established; but he was not allowed to enjoy the fruits of his labors for any length of time, as the great fire of 1871 came upon him just when he felt that he was free from all financial entanglement, and the bright outlook was again darkened by the great calamity, which left him penniless. However, with that indomitable energy that characterized the people of the stricken city, Mr. Sargent began at once to re-establish himself in the retail drug business at the northwest corner of Wabash Avenue and Sixteenth Street, and very soon did a good business. Here he added physicians' supplies, including surgical instruments and appliances, and remained in this location until 1878, when he removed to 125 State Street, adding here chemists' and assayers' apparatus and supplies to his increasing business, which became so extensive that in 1892 he removed to larger quarters, at 106 and 108

Wabash Avenue. In January, 1903, having purchased the stock of chemicals and chemical apparatus of Messrs. Richards & Co., 108 Lake Street, which with his similar stock he removed to the present quarters, 143 and 145 Lake Street. The drug and physicians' supply department was removed to 30 East Washington Street.

The above recital of Mr. Sargent's business career indicates the success of a most upright, honest and conscientious pharmacist of the past century. Let us scan his life and work from the professional side. He was in the foremost rank of advanced pharmacy and medicine. We do not over-estimate by saying that he contributed more to the progress of these professions in Chicago and the Northwest than any other man of the period. He was one of the charter members of the College of Pharmacy, organized in 1859, and of which institution he was an officer and guiding spirit for nearly half a century. He became a member of the American Pharmaceutical Association in 1864, and was its president in 1869, one of the founders of the Illinois State Microscopical Society and the State Pharmaceutical Association, a director of the Chicago Botanical Garden, a member and officer of the Chicago Academy of Science, a trustee of the School of Pharmacy of the Northwestern University, a member of the committee of the World's Congress in 1893, the oldest living member at the time of his death of Oriental Lodge of Free Masons of Chicago, a member of the church of the New Jerusalem. He was honored by the University of Illinois in bestowing upon him the honored title of Master in Pharmacy, he was equally honored by honorary membership by the Massachusetts College of Pharmacy, New Hampshire Pharmaceutical Association, and many other societies.

He was married to Miss Mary Elmer, of Jeffersonville, Indiana, and had two children, a son and a daughter, the latter, Mrs. T. P. Smith, Jr., with the widow surviving him.

Mr. Sargent was present at the golden jubilee meeting of the American Pharmaceutical Association, held at Philadelphia, 1902, although he was not feeling well at the time. After the meeting he made a short visit to friends in Massachusetts, and on returning home took to bed and lingered along from a complication of diseases due to old age until the end came. The funeral services took place April 27th, at 2 o'clock at the residence, 4822 Kenwood Avenue, largely attended by old citizens of Chicago, members of

the Masonic and religious societies, the medical and pharmaceutical professions, and especially attended by the members of the Chicago Veteran Druggists' Association, of which he was an honored past-president. He was buried at Oakwood Cemetery. The pall-bearers were Prof. J. H. Long, Thomas N. Jamieson, W. Bodemann, Henry Biroth, Thomas H. Patterson and Judson S. Jacobus. It was in everybody's mind, "That a good man has passed away, and the world is better for it that he has lived."

Among those who had tutelage and training under Mr. Sargent, we recall, previous to the fire, Samuel H. Larmanie, Peter J. Singer, Albert E. Ebert, Thomas W. Baird, Louis Strehl, John Corbidge, N. Gray Bartlett, Thomas N. Jamieson, Judson S. Jacobus, Isaac H. Fry, Edwin R. Smith, Edward C. Jones, H. M. Palmer, George Ives, Fred M. Schmidt, Rollin A. Keyes.

FORMULAS FOR SOME GALENICAL PREPARATIONS OF THREE VEGETABLE DRUGS THAT MERIT FURTHER MEDICAL ATTENTION.[1]

By George M. Beringer.

Galega Officinalis Linné.—This perennial herbaceous leguminous plant is indigenous to Southern Europe, and is but slowly acquiring a reputation as a valuable galactagogue. It is now more than thirty years since Gillett-Damitte, in 1873, in a communication to the French Academy, reported that experiments demonstrated a real foundation in fact for the popular belief in the galactagogue value of this plant. Since then a number of other investigators have confirmed this conclusion. The generic name, "Galega," is derived from the Greek and signifies to lead or induce milk, showing that as long ago as the time when Linnæus wrote his "Species Plantarum" this property was attributed to this particular species.

The tops, including stems and leaves, are the parts used for stimulating lacteal secretion. To the root is ascribed diaphoretic, diuretic, antispasmodic and anthelmintic properties. The older writers recommended an infusion of the herb (10–200), given in tablespoonful doses every hour or an aqueous solid extract given in 5-gramme

[1] Read at the meeting of the New Jersey State Pharmaceutical Association at Bernardsville, May 25, 1904.

doses from four to eight times per day. Neither of these are inviting forms of administration, and to this fact may be attributed the lack of the extended use which the remedy seems to merit. The fluid extract and syrup are more modern and elegant preparations for the exhibition of this medicine, and the following formulas for these are submitted:

EXTRACTUM GALEGAE FLUIDUM.

Goats' Rue herb in No. 30 powder	1,000 grammes.
Diluted alcohol, sufficient quantity to make	1,000 c.c.

Moisten the powder with 500 c.c. of the menstruum and pack in a percolator; then add enough of the diluted alcohol to leave a layer above the drug, and when the percolate begins to drop, cork up the percolator and cover it, and allow the materials to macerate for two or three days. Then proceed to percolate until the drug is exhausted. Reserve the first 900 c.c. of the percolate and recover from the remainder the alcohol and evaporate to a soft extract; dissolve this in the reserved portion and make the finished product measure 1,000 c.c. by the addition of sufficient diluted alcohol:

SYRUPUS GALEGAE.

Fluid extract of Goats' Rue	15 c.c.
Syrup	105 c.c.
Oil of fennel seed	1 c.c.

Mix.

Hawthorn Berries—Cratægus Oxyacantha (*Gärtner*); *Mespilus Cratægus* (*Linné*).—The hawthorn, or white thorn, is another European plant that has long been used in household medication. The leaves, the bark of the twigs, the flowers and the fruit have all been so used.

The fruit is a drupe-like pome about four or five lines long, oval in outline, externally dull-red in color. It rarely contains more than one stony kernel, which is entirely imbedded.

The fruit is said to possess a decided action as a cardiac tonic. The fluid extract is the proper form for its exhibition, and the following is the formula adopted by the writer:

EXTRACTUM CRATÆGI FLUIDUM.

Hawthorn berries in No. 30 powder	1,000 grammes.
Glycerin	50 c.c.
Alcohol and water, of each a sufficient quantity to make	1,000 c.c.

Mix the glycerin with 600 c.c. alcohol and 250 c.c. water and moisten the drug with a portion of this mixture. Pack in a percolator and pour on enough of the menstruum to leave a layer of liquid above the drug, and, as soon as the percolate commences to drop, cork up the percolator, cover it and allow to macerate for two or three days. Continue the percolation, gradually adding the balance of the mixture, and continue with a menstruum of 2 volumes alcohol and 1 volume water until the drug is exhausted. Reserve the first 850 c.c. of the percolate, recover the alcohol from the remainder and concentrate to a soft extract. Dissolve this in the reserve and make up the volume to 1,000 c.c. with a mixture of alcohol 2 volumes and water 1 volume.

Lachnanthes—Wool Flower, Red Root.—The entire plant of Gyrotheca capitata (Walt.), Morong., Lachnanthes tinctoria, Ell. The subject of this note is an indigenous plant of the Atlantic seaboard of the United States, from Massachusetts to Florida. It is found growing on the borders of ditches in sandy swamps and the cranberry bogs of New Jersey appear to be favored spots for its habitation. I have found it growing as far from the coast as Atco and Berlin, in Camden County. The materials for the experiments of the writer were collected near Hammonton, in Atlantic County, where it is fairly abundant.

Lachnanthes is a perennial herb 1½ to 2½ feet high. The lower leaves are equitant; the upper or stem leaves are alternate, being gradually reduced in size until those at the top become mere bracts. The plant is largely propagated by stoloniferous rhizomes; the roots are fibrous and have a bright red color. The flowers are in dense terminal cymous panicles, are yellow and externally densely woolly. The capsule is three-valved, and each cell contains about six disk-like seeds. The seed-coat also contains a bright red coloring matter and an intensely bitter principle. When chewed the plant colors the saliva yellowish-red and leaves a decidedly acrid taste. This acridity is probably due to calcium oxalate, as numerous acicular crystals of this salt are shown on microscopic examination of sections. The acridity largely disappears on drying.

The coloring matter present in the roots and seeds attracted the attention of the early observers and writers, and J. Redoute (" Les Liliaceæ ") wrote: " The roots and seeds yield to simple infusion a red color analogous to that obtained from garance (madder), but not so

solid or useful." Gronovius in his "Flora Virginia," 1772, states: "My inquiries lead me to think more favorably of this Heritiera as one of the plantæ tinctoria of the United States." Heritiera tinctoria was the name by which Gmelin had designated this plant.

Lachnanthes was used by the Indian tribes of the Southern States —especially the Seminoles of Florida. They called it "spirit weed," and used to chew the roots and tops with water. Millspaugh ("Medicinal Plants") says: "The root was esteemed as an invigorating tonic by the aborigines, by whom it was said to cause brilliancy and fearless expression of the eye and countenance, a boldness and fluency of speech and other symptoms of heroic bearing, with, of course, the natural opposite after-effects."

Porcher ("Resources of the Southern Fields and Forests") states that "the root is astringent and tonic," which is but a repetition of the statement in Griffith's "Medical Botany."

The Homeopaths have used the remedy and Lippe has tested it, and described the symptoms and therapeutic action. (Hale's "New Remedies" and Hugh's "Pharmaco-Dynamics.") Millspaugh (*loc. cit.*) says: "A tincture of the root has been recommended in typhus and typhoid fevers, pneumonia, various severe forms of brain disease, rheumatic wry-neck, and laryngeal cough!" After describing the physiological action of the remedy he observes: "The action of this drug appears as far as proven to be quite similar to that of pulsatilla."

Recently the drug has attracted some attention in England as a valuable remedy in the treatment of tuberculosis, and Dr. H. R. D. Spitta and Dr. A. Latham have published in the *Lancet* a note on their experiments on the chemical constituents and also physiological experiments on healthy as well as tuberculous animals. Guinea-pigs were killed by small doses of the extract, death being preceded by paralysis of the extremities. Their results seem to agree with the statement made by Homeopaths that the action of this drug is largely upon the cerebro-spinal system.

No complete chemical investigation of this plant has yet been published. The late Prof. Henry Trimble intended to make such an examination from materials supplied by the writer. His work on this subject was not published, and was probably not completed before his decease. If time will permit the writer will undertake this again when fresh material is obtained.

This plant should be collected for its drug value while in bloom, which occurs, according to locality, from June to September. August is the proper time for collection in New Jersey. The tincture of the fresh plant is believed to be the best form for its exhibition, and is prepared as follows:

TINCTURA LACHNANTHIS.

Take of the fresh plant freed from sand and dirt by washing in clear water . . . . 1,000 grammes
Cut up and pound to a pulp, then add alcohol . . . . 1,000 c.c.

and set aside to macerate for seven days. Then express and wash the dregs with sufficient alcohol by soaking and expressing until 2,000 c.c. of tincture is obtained. Filter and preserve in well-corked vials. The dose of the tincture is from 10 to 30 minims.

PROGRESS IN PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE LITERATURE RELATING TO PHARMACY.

By M. I. Wilbert,
Apothecary at the German Hospital, Philadelphia.

New pharmaceutical journals are usually considered as being among the more interesting novelties in pharmaceutical literature. This, to an extent at least, is due to the fact that they are almost invariably an indication of the needs and wants of an appreciably large class of pharmacists. This is particularly true where these new journals embody any new or novel features either in their contents or in their proposed aims. Among the pharmaceutical journals that have been but recently established is *The Journal of the Alumni of the Massachusetts College of Pharmacy.* This, as its rather lengthy name would indicate, is being published in the interest of the Massachusetts College of Pharmacy. The *Journal* appears to be intended as a quarterly of 48 pages, octavo, and is well printed on a good quality of paper. The material contained in the two numbers so far issued is well calculated to arouse the interest and the enthusiasm of the alumni of the college, and, if possible, to induce them to make additional and renewed efforts in advancing the interests of their alma mater.

Another comparatively new venture in the pharmaceutical journal line is the *Vierteljahresschrift für praktische Pharmacie*, published by

the German Apotheker-Verein, Berlin. This is also a quarterly and is intended, primarily, as a review of current pharmaceutical literature, particularly of such new remedies and novelties as are introduced from time to time.

Pharmacy and Chemistry are to be particularly well represented *at the St. Louis World's Fair*. Group 23 is entirely devoted to the chemical and pharmaceutical arts. According to the announcements already published, this group comprises laboratory supplies, chemicals, drugs, pharmaceutical preparations, artificial textiles, paints, pigments, dye stuffs, rubber goods and pyrotechnics.

In addition to this there will also be an interesting outdoor exhibit of growing medicinal plants, made by the Bureau of Plant Industry of the U. S. Department of Agriculture. This exhibit will be under the personal supervision of Dr. Rodney H. True, the Physiologist to the Department of Agriculture, and will comprise growing specimens of a very large number of medicinal plants. In addition to the plants actually under cultivation the Bureau of Plant Industry will also have an indoor exhibit in which different parts of plants, properly dried and prepared, will be shown.

Weeds Used in Medicine is the title of a "Farmers' Bulletin" recently issued for gratuitous distribution by the U. S. Department of Agriculture.

The object of this particular publication is to instruct farmers and others that may be interested how to gather and prepare a number of the more common weeds that are used as medicines.

The Bulletin contains 31 illustrations of the weeds described and may be had on application to the Secretary of Agriculture, Washington, D. C.

The History of the Paris School of Pharmacy has been prepared and is now in course of publication. It is being issued to commemorate the centennial celebration of the founding of the school and is to be quite an elaborate publication. It is to contain biographies of the several professors that have been connected with the school since 1803, also a history of the origin and progress of the school since its inception.

A History of the Massachusetts College of Pharmacy, by Wilbur L. Scoville, is to be found in the second number of the *Journal of the Association of the Alumni of the Massachusetts College of Pharmacy* (March, 1904, page 6). From this sketch it appears that the Massa-

chusetts College of Pharmacy is one of the oldest pharmaceutical associations in the United States, being organized in 1823, or about two years after the founding of the Philadelphia College of Pharmacy. As a teaching institution, however, or as an incorporated society it only dates to 1852, the regular courses of lectures were not commenced until 1866, while the date of the first graduation is given as 1869.

The Affiliation of the College of Pharmacy of the City of New York with Columbia University (A. J. P., 1904, page 191), has been most liberally commented on in a number of pharmaceutical as well as medical journals. With but few exceptions, the consensus of opinion appears to be that it has been a step in the right direction and that it bodes well to place pharmacy in this country on a much higher plane than that occupied by it at the present time. That this particular move was quite in keeping with the spirit of the times is evident from the proposed scheme to merge the Massachusetts Institute of Technology with Harvard University, with a view of increasing the efficiency of the two institutions.

This evident tendency to bring technical teaching more closely in contact with, or to make it a part of the curriculum in the larger universities, will and must increase the demands made on the various schools for a more thorough education and training, and this in turn will of itself insure a marked improvement in the social condition of the persons engaged in these particular lines.

The Physiological Standardization of Drugs, particularly of digitalis, has been criticised by several German investigators recently. Among others C. Focke, of Düsseldorf (*Arch. d. Phar.*, 1904, page 699), asserts that frogs caught at different seasons of the year will give variable results. To get correlating or absolutely reliable results it would be necessary to confine experiments to the summer season, as it has been found that frogs caught at this time of the year show the least variability.

Adulterated Powdered Gentian.—H. S. Collins (*Chem. and Drug.*, 1904, page 404) reports meeting with several samples of powdered gentian which he found to be grossly adulterated. The general appearance, aroma and residual ash gave no ground for suspicion. In three samples examined the adulterant was powdered almond shells, and in two others pine wood and woody tissue, in addition to the almond shells. In this connection Collins calls attention to the

fact that too much reliance should not be placed on the physical appearance or on the residual ash, and suggests that the microscope offers the most reliable means for determining the genuineness or otherwise of powdered drugs.

False Ipecacuanha.—W. Brandt (*Apothek. Zeitg.*, 1904, page 102) describes several roots that have been offered in Germany in place of true ipecac. The roots are said to be quite distinctive and not readily to be mistaken for Rio ipecac. The starch grains are comparatively large, and in many of the cells raphides of calcium oxalate are not only more numerous, but the needle-like crystals appear to be larger than in true ipecac.

A False Scammony Root.—Harold Dean (*Phar. Jour.*, 1904, page 327) says that the root of *Ipomoea Orizabensis* (Ledan), also known as "woody jalap" or "male jalap," has recently appeared on the market in considerable quantities. It is said to yield from 12 to 18 per cent. of a resin closely resembling, if not identical with, the resin of scammony.

This root is supposed to be the source of much of the "commercial scammony resin" that is being sold in England at the present time. As true scammony root only yields from 5 to 6 per cent. of resin, the preference of manufacturers for the root of *Ipomoea Orizabensis* is readily explained.

Spurious Virginia Prune Bark.—At a recent meeting of the Pharmaceutical Society, London (*Phar. Jour.*, 1904, page 360), Horace Finnemore, pharmacist to Guy's Hospital, London, called attention to a sample of wild cherry bark that had come to the pharmacy of the hospital in the ordinary course of business, which when moistened with water did not develop the odor of benzaldehyde.

Examination under the microscope showed it to be devoid of the characteristic stone cells found in *Prunus Serotina*, but to have numerous crystals of calcium oxalate, in stellate masses, and sclerenchymatous fibres.

These fibres appear to be characteristic of the bark. Mr. Finnemore, while not able to definitely decide on the botanical origin of the spurious bark, suggests that it has many points in common with that obtained from *Prunus Avium*.

The present status of our knowledge of strophanthus seeds was carefully reviewed by several writers in a recent number of the "Berichte der Deutschen Pharmaceutischen Gesellschaft." E.

Gillig believes that the most desirable seed available at the present time is that of *Strophanthus Gratus* (Wal. and Hook.). *Strophanthus Gratus* contains a glucoside that is readily crystallized. This has been designated *gratus strophanthin* by Thoms, who believes it to have high therapeutic value. It has the following chemical composition: $C_{30}H_4O_{12}$ $9H_{20}$. *Gratus strophanthin* is soluble in 100 parts of water at ordinary temperatures, more readily soluble in alcohol and amyl-alcohol; it is but slightly soluble in ether, chloroform and acetic ether.

Mydriatic Alkaloid in Lactuca Virosa.—Messrs. E. H. Farr and R. Wright at a recent meeting of the Pharmaceutical Society of Great Britain contributed an account of a careful investigation into the controversy on the existence of a mydriatic alkaloid in *Lactuca Virosa.* The results of a careful investigation appear to confirm Dymond's assertions that *Lactuca Virosa* contains a mydriatic alkaloid in demonstrable quantities. (See A. J. P., 1892, page 46)

The Distribution of Alkaloids in Conium Maculatum, was the subject of another very interesting paper, presented by Messrs. Farr and Wright, at a recent meeting of the Pharmaceutical Society. (*Chem. and Drug.*, 1904, page 266.)

They demonstrate that the development of the alkaloid is closely associated with the development of the fruit.

The amount of alkaloid found varied from 0·031 per cent. in the leaves of young plants to 0·975 per cent. in the green fruit of plants having reached their full growth.

The results obtained by the writers of this paper would appear to favor the continued use of conium seed in preference to any other portion of the plant.

Fetron.—This is the name given by the manufacturers to a new ointment base that is said to combine many of the qualities of lanolin and vaseline, facilitating absorption while at the same time providing an efficient protective covering.

Fetron is a solution of stearic acid anilide in vaseline. The former, a white crystalline substance, melting at 93° C., and formed by heating anilide with stearic acid. Stearic anilide offers great resistance to chemical reagents, being unaffected by boiling with caustic alkalies, and passing through the human system unchanged. It may be mixed with a great diversity of medicaments without influencing their action or exerting any of its own and does not become rancid or decompose on exposure.

Stearic anilide is soluble in ether, alcohol, chloroform, benzine, benzol and carbon disulphide. (*Apothek. Zeitg.*, 1904, page 234.)

A Differential Test for Phenacetin and Acetanilid is given by Et. Barral (*Jour. de Phar. et de Chemie*, 1904, page 237), as follows:

A solution of phosphomolybdic acid added to an aqueous solution of acetanilid gives a yellow precipitate, which does not dissolve on heating. The same reagent added to a solution of acetanilid gives a bright yellow precipitate, which is readily dissolved again on heating.

Mandelin's reagent—ammonium vanadate, 1; sulphuric acid, 200 —produces a bright red color in a solution of acetanilid that is rapidly changed to a greenish brown. In a solution of phenacetin the same reagent produces an olive-green color that on heating is changed to brown and ultimately black.

The Inclusion and Occlusion of Solvent in Crystals has been investigated by Theodore William Richards (*Proc. Am. Phil. Soc.*, 1903, page 28), who advances this as one of the most frequent as well as one of the most insidious sources of error in quantitative chemical investigations.

Mr. Richards recounts several experiments that would appear to indicate the prevalence and magnitude of the possible inaccuracy from the unexpected included mother liquor and also demonstrate the difficulty of eliminating the mother liquor by ordinary means. This occluded solvent is distinct from the water of crystallization and is even more difficult to eliminate than the latter.

It is for this reason that Mr. Richards believes it to be practically impossible to determine with the exactness demanded in the most accurate work, the true weight of any salt containing water of crystallization.

The N-rays discovered by a French physicist, M. Blondlot, nearly a year ago, have been attracting considerable attention during the past few months. This is largely due to the work that has been done in France by Charpentier, Blondlot and others.

N-rays appear to be a form of radiation quite distinct from the Roentgen, or X-rays; they do not affect photographic plates directly, but do have the property of increasing the luminosity of phosphorescent bodies, like sulphid of calcium.

The sources of N-rays are numerous and new ones are constantly being discovered. It has been found that they are emitted by a

number of sources of artificial light, also by a vacuum or X-ray tube in action.

Charpentier has demonstrated that the human body is a constant and varying source of N-rays, depending apparently on the activity of the tissues composing the particular part under observation.

The Constitution of Epinephrin.—According to Dr. H. A. D. Jowett, it is now generally considered that the Epinephrin of Abel, Suprarenin of Fürth and the Adrenalin of Takamine are in reality more or less pure forms of the same constituent; a catechol derivative with possibly a hydrogenized pyrrhol nucleus.

His investigations of this material have led him to agree with Aldrich that it has the composition $C_9H_{13}N.O_3$. (*Chem. and Drug.*, 1904, page 276.)

A Danger of Adrenalin.—Neugebauer (*Am. Med.*, 1904, page 762, from *Centbl. f. Phar.*) reports that he has seen several cases of localized gangrene following the use of solutions to which adrenalin had been added, for the infiltration-method of local anæsthesia.

Elderly persons were especially liable to this, and he therefore cautions against the use of adrenalin in old people.

Bactericidal Powers of Alcohols.—G. Wirgin (*Zeit. f. Hyg.*, 1904, page 149, through *Brit. and Col. Drug.*, 1904, page 351), from a large number of experiments that he has made, concludes that the disinfecting power of an alcohol rises with its molecular weight. Tertiary alcohols, however, are weaker than primary or secondary alcohols of the same series. The strength of an aqueous solution which acts most powerfully is, for methyl alcohol, 60 to 70 per cent.; ethyl alcohol, 60 per cent.; propyl alcohol 30 per cent., and for the higher alcohols the saturated solutions.

Upon dry germs absolute alcohols are practically without action, and the same is true of the higher concentrations of water soluble alcohols.

Alcohol from Fæces.—The wide publication that was given to the proposition that it was possible to obtain alcohol from the destructive distillation of fæcal matter has apparently led to a more or less widespread misconception of the commercial practicability of the scheme. While it has been asserted that as much as 7 or even 9 per cent. of alcohol has been obtained from fæcal matter, these statements have so far at least not been duplicated by repu-

table chemists. The best that has been done to the present time is not more than one-tenth the amount claimed by the original projectors. (*Phar. Jour.*, 1904, page 466.)

The Production of Oil of Rose in Bulgaria.—An interesting article on the rose-oil industry in Bulgaria has recently been published in the *Pharmaceutische Post*, Vienna (1904, page 77).

The oil of rose of the ancients, referred to by Dioscorides in his Materia Medica, was produced by macerating rose leaves in olive oil. In this shape the perfumers used it for many centuries. The distillation of rose leaves was probably first introduced about the eighth century, and it was not until the end of the sixteenth century that the minute oil globules that occasionally appeared on the surface of rose water were collected and used.

In Bulgaria the centre of the rose industry is found in Kazanlik, Nova-Zagora and Tchirpan. This region is about 400 meters above the sea level, and has a range of temperature of 55 to 60 degrees centigrade. By far the greater number of Bulgarian distillers use *Rosa Damascena* Miller, beginning to gather the flowers about the middle of May and continuing for about one month.

It requires 3,000 kilograms of rose petals to produce one kilo of the oil. The crop in 1903, the largest for thirty years, was 6,260 kilograms, in place of 3,900 kilograms in 1902, and 3,200 kilograms in 1901.

Formation of Terpene compounds in chlorophyl containing organs. —E. Charabot and A. Hebert have found that the systematic and complete removal of the inflorescences from growing peppermint plants brings about a marked increase of the stem and green parts, and a corresponding increase in the percentage yield and absolute weight of oil obtained on distillation.

Light has a marked influence on the secretion of essential oil, more being formed in those parts freely exposed to its influences than in those which are shaded. (*Phar. Jour.*, 1904, page 466, from *Compt. Rend.*)

Oil of Cassia.—Schimmel & Co., in their Bericht for April, 1904, state that they have on several occasions recently observed that samples of oil of cassia sent them for examination had been adulterated with colophony (rosin).

The adulterated oils leave a greater residue on distillation, and also give a decided precipitate when treated with a saturated alcoholic solution of acetate of lead.

Anethol.—According to the recent Bericht of Schimmel & Co., the use of anethol is rapidly displacing that of oil of anise. This is, of course, due to the fact that the slight difference in price is more than compensated for by the 10 per cent. of other and usually useless constituents that are present in commercial oil of anise in addition to the anethol.

SOME RECENT LITERATURE.

AN ATTEMPT AT A CHEMICAL CONCEPTION OF THE UNIVERSAL ETHER.

D. J. Mendeléeff, the celebrated author of the "Periodic System of the Elements," has published some speculations in regard to the ether.

From a realistic standpoint it is inevitable that weight and chemical individuality should be ascribed to the ether. It must be a distinct chemical substance so light that it can escape the attraction of the fixed stars by the swiftness of the motion of its molecules; it can have no chemical affinity; its power of diffusion must be so great that it can penetrate all bodies, and thus elude being weighed, although it actually possesses a very minute weight. It can be assumed to be an inactive gas of the argon-helium series with very small atomic weight. By means of *inter*polation the author has predicted new elements (scandium, gallium, and germanium), and he ventures to make *extra*polations below helium. In the place before hydrogen he assumes the existence of an inactive element, which possibly is identical with *coronium*, with an atomic weight estimated at about 0·4. The ether must have a still smaller atomic weight, the value of which, $< 0{\cdot}17$, on account of the double extrapolation, is very uncertain. For the ether as an element the author proposes preliminarily the name *Newtonium.* He calculates also, that, in order that it might escape from the largest bodies of the universe, the atomic weight of the ether might necessarily be as small as one-millionth of that of hydrogen.

The author gives, in addition, a realistic explanation of radioactivity by supposing that the radio-active elements (U, Th, Ra), on account of their abnormally high atomic weights, are capable of holding a relatively large number of the ether atoms about their large centres of mass, without combining with them chemically, and that the arrival and departure of the ether molecules is accompanied

by disturbances in the ethereal medium which produce the rays of light.—From an abstract in *Chem. Centralblatt* (1904, i, 137), through *Am. Jour. Sci.*, March, 1904, page 243.

A NEW METRIC MEDICINE GLASS.

After considerable discussion as to the feasibility of making a moulded, conical glass that would be sufficiently inexpensive to be used as a medicine glass, and after submitting several models and offering a number of suggestions, M. I. Wilbert (*Amer. Med.*, May 7, 1904, p. 735) was finally successful in inducing one of the large manufacturers of hollow ware to undertake and make for him a moulded glass that would conform to his ideas and requirements.

The resulting medicine measure, a picture of which is appended, is of inverted cone-shape, with a heavy base or foot. It is 75 mm. high, over all, and has an inner diameter of 50 mm. at the lip, while at the base the inner diameter is but 10 mm. At the 1-teaspoonful mark, which is 25 mm. above the bottom, the inner diameter of the glass is about 20 mm., while at the 2-teaspoonful mark, 35 mm. above the bottom, the diameter is but little more than 27 mm.

Specimens of this medicine glass shown at the meeting of the American Pharmaceutical Association at Mackinac Island (August, 1903) were favorably commented on by a number of the members.

As will be noted, this glass conforms to one of the most reasonable requirements for measures of capacity, and one that should be insisted on for all measures intended for liquids, namely, that the height of the contained liquid at any given graduation, should be greater than its diameter.

METRIC MEDICINE GLASS.

The evident advantages possessed by a graduated conical glass, to measure differing quantities of liquid, are so apparent that it is surprising indeed that this particular shape has not been suggested or used before as a popular dose measure.

In actual practice these glasses have proved to be even more satisfactory than was at first expected. In addition to being infinitely more accurate as dose measures, particularly for the 1- and 2-teaspoonful quantities, they also facilitate the administration of doses of liquid medicines. This

latter is due to the fact that the short sloping sides of the glass make it possible to bring the edge of the glass to the lips of the patient without slopping or spilling any of the contained liquid, while the comparatively wide mouth of the glass facilitates drinking from it. In addition to this the glass has no sharp corners and is therefore very readily cleaned and easily kept clean.

The most surprising advantage, however, is the durability that the glass has been demonstrated to possess. This particular shape has been in use at the German Hospital, Philadelphia, for nearly a year, and during that time, despite the fact that there has been a decided increase in the number of patients treated, they have broken less than one-half the number of medicine glasses that were used for a similar period of the previous year. This is all the more surprising as it had been argued that a glass having a foot like a goblet, would necessarily be more fragile than one having straight sides.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Pharmaceutical Formulas, being a supplementary volume comprising a consolidation of the Medicine-stamp Acts (with historical notes); formulas for known, admitted, and approved remedies; an Australian Hospitals Formulary; and many other recipes. Published at the offices of *The Chemist and Druggist*, 142 Cannon Street, London, E. C. Branch offices: Adelaide, Melbourne and Sydney, Australia. 1904.

In an editorial note it is stated that "the publication of this supplementary volume of 'Pharmaceutical Formulas' is necessitated by changes in the administration of the Medicine-stamp Acts, consequent upon judicial decisions whereby medicines which are sold under names referring to ailments of the human body become dutiable on and after March 31, 1904; but if such medicines are sold by registered chemists as 'known, admitted and approved' remedies they are exempt from stamp duty." The Board of Inland Revenues has wisely exempted the formulas published in the British Pharmacopœia and other well known books of reference. The subscribers of the *The Chemist and Druggist* were invited to contribute their formulæ for publication in the present volume and all those received up to the end of 1903 are included.

"Each important chapter is prefaced by remarks which indicate

the nature of the contents, especially in respect to liability to duty or otherwise. As the primary object of the volume is legal rather than pharmaceutical, there is more variety in the formulas than the writer of a book of formulas would ever dream of presenting, but the collection has the great merit of representing the actual working formulas of those who have been selling the preparations."

The book contains chapters on the following subjects: The medicine-stamp Acts; Australian formulas; preparations with ailment names (abscess-croup); preparations for coughs, indigestion, neuralgia, toothache; preparations with body-names, with descriptive titles; galenical preparations; miscellaneous preparations; preparations chiefly for the toilet; unclassified formulas; etc. A good index completes the volume. The book is very interesting in presenting, as has already been stated, actual working formulas. Care must be exercised in the practical use of the book, as some of the formulæ can be improved. The book is also valuable from a historical point of view, containing, as it does, without any editing the formulæ sent in by the subscribers of *The Chemist and Druggist.*

UNIVERSITE DE PARIS. ECOLE SUPERIEURE DE PHARMACIE. Theses for obtaining the degree of Doctor of Pharmacy of the University of Paris during 1903–1904:

"Histologie Comparée des Gelsémiées et Spigéliées," by Edmond Morelle. An illustrated monograph on the comparative histology of gelsemium and spigelia and other members of the Loganiaceæ.

"Contribution a l'Etude de la Présure chez les Végétaux," by Maurice Javillier. A thesis on the rennet-like ferments found in plants.

"Action de l'Eau sur la Sécrétion Urinaire," by Henri-Joseph Bretet. A thesis on the influence of water on the character of the urine.

"Dosage de l'Azote Nitrique," by Leon Debourdeaux. The author gives, as a result of his work on the determination of nitric acid, a modification of the method of Pelouze-Fresenius.

"Des Bactéries Denitrifiantes," by Augustin-François-Alexis Boutron. A monograph in the denitrifying bacteria, giving morphological data, character of cultures and biochemical character.

"Contribution à l'Etude des Fluorures," by Paul-Edouard Defacqz. A study of the fluo-chlorides, fluo-bromides and fluoiodides of the alkaline earth metals.

"Essais sur les Chromites de la Série Magnesienne," by Abel-Auguste-Marie Esnault. An essay on the chromites of magnesium, manganese, iron, metal and cobalt. H. K.

PROCEEDINGS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION at the fifty-first annual meeting held at Mackinac Island, Mich., August, 1903. Also the constitution, by-laws and roll of members. Baltimore, 1903.

This, the fifty-first annual volume of the proceedings of the American Pharmaceutical Association, has finally been distributed to the members. It contains as a frontispiece a very creditable half-tone portrait of the late George Washington Kennedy, who for many years was the secretary of the Council of the American Pharmaceutical Association, and was also the secretary of the committee of the Council on membership.

While this volume does not differ materially in style and general make-up from any of the volumes that have preceded it for a decade or more, it nevertheless fully maintains the standard that has been established by these annual volumes for the variety and interesting nature of their contents.

This particular volume, like those immediately preceding, is rather a ponderous one, containing, as it does, upward of 1,100 pages of printed matter. Of these, 567 pages are devoted to the minutes of the proceedings at the Mackinac meeting, and 423 pages are taken up by the report on the progress of pharmacy. The whole volume is covered by an index that takes up 17 double-column pages, comprising upwards of 1,250 references.

Altogether it may be said that this latest volume of the proceedings constitutes an almost inexhaustible mine of pharmaceutical information, and that it is practically indispensable to the pharmacist that wishes to keep well informed, or to remain in touch with the progress that is being made in his particular line.

Despite the many excellent features that are embodied by these annual volumes, there are several rather serious objections that can be made to the book as published at the present time. The first of these is the unnecessary and unusually undue delay in publication. This is a fault that has been called attention to repeatedly, and is one that should be remedied, if the proceedings are to be of the greatest possible interest and value to the members of the Association.

The second objection that might rightfully be advanced is the very conservative use of the editorial blue pencil.

The volume before us contains page after page of matter that could very well have been omitted, as it does not furnish interesting reading, nor does it add in any way to the value of the remaining material. In this connection a very large amount of the, at times, verbose discussions might very well have been omitted entirely, or, if included, instead of being given verbatim and in detail, would be of much greater interest, and more likely to be considered, if given in abstract.

The third objection, and again a serious one, in connection with a volume that is intended to be used as a reference book, is the sparseness of the index, although here there appears to be a decided improvement over the index in the volume immediately preceding.

These several shortcomings are, of course, inherent, and can only be remedied if the several members of the Association, recognizing that they exist, demand the necessary changes.

Apart from these and similar shortcomings, that are really mere secondary and detail matters of opinion, the volume now before us is one that should be found in every up-to-date pharmacy, and is, taken all in all, the strongest argument that could possibly be offered for a pharmacist to seek membership in the American Pharmaceutical Association. M. I. W.

OBITUARIES.

DR. ALOIS PHILIPP HELLMAN, the founder of the *Pharmaceutische Post*, Vienna; also one of the founders of the Austrian Pharmaceutical Association, died May 29, 1903, in his sixty-third year.

AUGUST GARCKE, the oldest, and probably the best-known, German botanist; Professor of Botany at the University of Berlin, died January 10, 1904, in his eighty-fifth year.

Professor Garcke was born October 25, 1819; his "Flora of Germany" is a well-known and frequently-quoted handbook.

M. I. W.

PHARMACEUTICAL MEETING.

The last of the present series of pharmaceutical meetings of the Philadelphia College of Pharmacy was held on Tuesday afternoon, May 17th, Mr. Walter A. Rumsey, a member of the Board of Trustees, presiding.

Mr. Eugene Ross, traveling representative of the manufacturing firm of Johnson & Johnson, New Brunswick, N. J., was the first speaker introduced and gave a most interesting address, entitled "A Pharmacist's Impression of the Orient," which will be published in a later issue of this JOURNAL, and exhibited in this connection some very valuable and interesting Japanese and Chinese souvenirs. Mr. Ross said that in Japan physicians dispense their own medicines and that there are no pharmacies proper. There are, however, numerous places for the sale of patent medicines, but nothing containing poisons is allowed to be sold by their proprietors. Chemists occupy a more responsible position, being licensed by the Government to examine all chemicals and medicines brought into the country, and to receive the revenue therefrom. In addition wholesale druggists in Japan must submit samples of their products to the Government for analysis, after which the chemists' stamps are placed upon the articles examined. If, however, the chemicals or medicines should not be found to be up to the standard, the chemist is fined from 1 to 10 yen ($1 to $10) for his failure to report correctly on the samples submitted. Thus, as a matter of fact, very pure chemicals are sold in Japan.

Mr. Ross further said that pharmacy in Japan dates back nineteen years, when the first Japanese Pharmacopœia was published. This work was modelled after the German Pharmacopœia. In addition all chemicals used to be obtained from Germany. The German influence is still strong, but the Japanese Government is becoming more liberal, and they are now looking to America and other countries for example. Some of their methods are so arbitrary, however, that it is predicted that in five years there will not be a foreign chemist in the country.

With regard to China, Mr. Ross said that it was very difficult to learn much about either pharmacy or medicine there. The medicines are mostly put up in wax and bear a seal upon the outside, which latter custom seems to prevail everywhere in the East. As is well known ginseng is largely used and is said to be in almost every preparation used.

Mr. Ross also visited the English colonies in South Africa, and said that there is a very great difference between Japan and these countries in pharmaceutical practice. The stores are very modern and carry a large stock; the physicians write prescriptions and these are put up by pharmacists or chemists who are well educated.

In the discussion of his address Mr. Ross said, in reply to a question by Professor Sadtler, that the metric system is used abroad altogether, and that the goods made by his firm for the Eastern market are put up in metric quantities.

Commenting upon trade conditions in the East, Mr. Ross said that he had visited the countries all the way from South Africa to Japan, and had found American goods to be the best in the Eastern market and everywhere in demand. In addition he said that our trade with the Orient had quadrpuled within the last fouryears.

Prof. Joseph P. Remington, Chairman of the U.S.P. Revision Committee, read a paper giving some of the salient features of "The Forthcoming Pharmacopœia" (see page 253). It was stated that the work is now being printed, and that it will in all probability be ready in October. Professor Remington also said that for the first time in the history of pharmacopœial revision in the United States the work is being revised under the control of a chartered organization. Probably one of the most conspicuous changes in the new book will be the introduction of doses.

Replying to a question by Dr. Lowe, Professor Remington said that the 1890 U.S. Pharmacopœia went into effect ninety days after it was issued, and that the new edition would probably be made effective in January, 1905. He said that it was important to have the date when the edition becomes authoritative stated on the title page.

Mr. Samuel R. Kennedy, a condensed-milk manufactuturer of Philadelphia, read a paper on the "Condensed Milks of Commerce," in which he showed that the quality of condensed milk depends very largely on the quality of the cow's milk used in its manufacture, and said that in order to secure milk of the proper quality the condensed-milk manufacturers make contracts with dairymen stipulating the care which they shall exercise, not only with regard to cleanliness, but also as to the kind of food which they shall give the cows. Speaking of the uses of condensed milk, Mr. Kennedy said that it forms a body for many food-products, it being a constituent of nearly all kinds of candy. Owing to the perishable nature of cow's milk, nearly all restaurants use condensed milk, which is diluted with fresh milk. Another advantage which this milk has is its property of curing bad coffee, or coffee that has stood for some time.

In reply to a question by Mr. Joseph W. England as to the use of preservatives in evaporated cream, Mr. Kennedy stated that in the case of plain heavy condensed milk the cane sugar which is added owes its antiseptic properties in all probability to the bisulphite of calcium which it contains, and that in evaporated cream nothing was added. He further stated that albumen was coagulated at 157° and casein at 180°.

Melvin W. Bamford, P.D., read a paper on the "Nomenclature of the Glycerophosphate Preparations," and offered a resolution recommending that an effort be made to secure greater uniformity in the strength and nomenclature of these preparations. (See page 277.) The resolution was seconded by Professor Kraemer, who suggested that copies of the same be sent to the Committee on National Formulary, to the Committee of Revision of the U. S. Pharmacopœia, and to the American Medical Association, after which it was adopted by the members present.

"A Quarterly Report on Progress in Pharmacy," by M. I. Wilbert, Ph.M., was read by title owing to the lateness of the hour. (See page 286.)

Professor Kraemer called attention to some authentic specimens of Pilocarpus leaves sent by Dr. Frederick B. Power, Director of the Wellcome Chemical Research Laboratories, London, as follows: *Pilocarpus Jaborandi* Holmes (Jaborandi Folia, B. P.); *P. microphyllus* Stapf (Maranham Jaborandi); *P. racemosus* Vahl (Guadaloupe Jaborandi); *P. pennatifolius* Lem. (Paraguay Jaborandi); *P. spica us* A. St. Hil. (?) (Aracati Jaborandi); and also False Maranham Jaborandi (? *Swartzia decipiens* Holmes) and *Piper Jaborandi* Vell.

Attention was also directed to a number of specimens of vegetable origin collected by Jacob S. Beetem in Jamaica. They were as follows: Cacao pods, coffee berries, bay leaves, Ceylon cinnamon leaves, gamboge, lace bark, fruit of *Mucuna pruriens* (cowhage), seeds of *Abrus precatorius*, and some seeds and fruit known to the natives as "stinking foe," "Job's tears," "soap berries," "John crows," "woman's tongue," and "baby's tongue."

On motion of Joseph W. England a vote of thanks was tendered those who contributed to the interest and value of the meeting.

HENRY KRAEMER, *Secretary.*

Yours Respectfully
G D Rosengarten

／THE AMERICAN
JOURNAL OF PHARMACY

JULY, 1904.

ROSENGARTEN & SONS.

By William McIntyre.

The manufacturing business of the firm of Rosengarten & Sons was established in 1822. The original partners were Seitler and Zeitler; the former a Swiss from one of the French Cantons, the latter a German from Würzburg.

George D. Rosengarten was at that time engaged in the wool business, and being a competent accountant, and having the confidence of this chemical firm, was engaged to settle the accounts. Being conversant with the French language as well as his native German, he was able to do this to their evident satisfaction.

On December 1, 1823, he became a partner of Carl Zeitler under the firm name of Zeitler & Rosengarten. From this time on nearly all the books of this firm and its various successors are still in a state of preservation, and the history can be followed with some exactness.

Quinine Sulphate, Sulphuric Ether, Spirit of Nitre, Aqua Ammoniæ, Acetic Ether and Hoffman's anodyne were made at this time.

The first sale of Quinine by the firm of Zeitler & Rosengarten was made in December, 1823.

On October 13, 1824, Carl Zeitler withdrew, and the receipt showing that his interest was bought by Geo. D. Rosengarten still exists. From this time the business gradually increased, and later his cousins, Samuel and Hermann Rosengarten were employed.

In 1832 Morphine Sulphate and Acetate were manufactured, the opium being bought from the local wholesale druggists.

Piperine was made in 1833; Mercurials and Strychnine in 1834. Veratrine had considerable sale, and was made in 1835; and Iodide of Lead, Deuto and Protoiodide of Mercury, Iodide of Iron and Iodide of Sulphur; Codeia, Bismuth and Silver salts were made in 1836.

On February 15, 1836, the firm name became Geo. D. & S. Rosengarten, but this only lasted until March 10th of the same year.

In 1835 N. F. H. Denis, a young Frenchman, a pupil of the great chemist Robiquet, was employed as chemist, and on January 1, 1840, became a partner, the name of the firm becoming Rosengarten & Denis, and continued as such until 1853, when Mr. Denis withdrew.

Samuel G. and Mitchell G., sons of G. D. Rosengarten, were then admitted to partnership, and the firm name changed to Rosengarten & Sons.

In 1860 H. B. Rosengarten and Adolph G. were admitted to partnership. The latter enlisted in the 15th Pennsylvania Cavalry (Anderson Troop), rose to the rank of Major U. S. V., and was killed in a cavalry charge at the battle of Murfreesboro, Tenn., on the 29th of December, 1863, on the twenty-fourth anniversary of his birth.

George D. Rosengarten retired from business in 1879, after fifty-six years of active business life. He was a director of the Mechanics Bank for more than fifty years, and of the Pennsylvania Railroad for a number of years; upon his retirement from business he declined re-election to the boards of both of these corporations. He died March 18, 1890, at the age of eighty-nine.

Frank H. Rosengarten was admitted to the firm in 1879. Mitchell G. died in 1898, and Samuel G. and Frank H. Rosengarten retired from the business the same year. The firm was then continued by H. B. Rosengarten and his sons, George D. and Adolph G.

In 1901 the business was incorporated under the laws of the State of Pennsylvania, with the title of Rosengarten & Sons, Incorporated.

H. B. Rosengarten is president, George D. vice-president, and Adolph G. secretary and treasurer, who, together with Joseph G., Jr., and Frederic Rosengarten, constitute the board of directors, all of whom take an active part in the management of the business.

PHARMACY AND CHEMISTRY AT THE WORLD'S FAIR.

By Carl G. Hinrichs, Ph.C.

I.—GENERAL SURVEY.

The Louisiana Purchase Exposition can safely be said to be the largest World's Fair ever held. As to grounds and as to space covered by buildings, it exceeds Chicago and Paris. Exhibitors have spared neither time nor expense to make their exhibits interesting and attractive. Especially in the mining and machinery divisions has an attempt been made to show motion exhibits; thus what would attract the specialist only, becomes of interest to the average sightseer. Processes of various manufactures are shown in actual operation. In the pharmaceutical and chemical arts, however, processes are mainly indicated by the products formed in the successive steps, taken in the course of manufacture to the finished chemical.

If one comes to the Fair with the expectation of finding the chemical and pharmaceutical exhibits collected in the Liberal Arts Building, as the Fair management's classification states, he will be disappointed. Subjects of pharmaceutical interest are to be found everywhere, every building shows some products of the soil or of man's handiwork that are distinctly pharmaceutical.

How closely the leading exhibitors have adhered to the general classifications may be indicated by taking the case of the magnificent display made by the German chemical industry. You would hardly expect to find this display in the Electricity Building. The connection between articles of common chemical manufacture, of technical and analytical furniture, glassware, balances, optical instruments, porcelain goods and the various instruments of precision used by chemists, with electricity, is surprising to the chemists and pharmacists. But if you pass through the exhibit a small case, containing some 200 chemicals made with the current will be found, and here is then the ostensible reason that all of Germany's great chemical industry has been located in this building. Most of these articles the writer was informed can not be made at a profit by electrolysis, still they enabled the Germans to locate in the most prominent building on the grounds, and not in the Liberal Arts way back by the fence.

As pharmacy draws upon the three kingdoms of nature for its first products, and works these up in various ways, we really find

something distinctly pharmaceutical wherever we may turn. This being the case, the writer thought it might be of interest to note those exhibits that are of more than passing interest to the profession, and state where they may be found.

Entering the Mines and Metallurgy Building, the mineral wealth upon which the manufacturer of our chemicals draws is shown. Many exhibits strikingly show the great resources of the several States in certain lines. Pennsylvania has a colliery in miniature working full blast. Alabama's celebrated iron is shown in a colossal statue of Vulcan, whose head touches the roof. Colorado has a small nugget of silver that the Vulcan might use as a watch charm, and from which a paltry $6,000 in silver coin could be made. Minnesota constructed a large geological model of its iron ore beds, together with the method of shipping the mined ore on the iron steamers.

While a great many of the exhibiting States show a certain sameness in their exhibits, such as large blocks of coal, minerals, building stones and oil, others have bestowed much care on the arranging and collecting of their mineral wealth, and of these Colorado undoubtedly leads.

Colorado shows a large circular case filled with native gold in the various forms as found in this State; also several cases of native silver. Especially striking are the cases of finely crystallized ores, gems and minerals found associated with the ores in the gangue. Two cases of uranium ores from Montrose County, one filled with select specimens of pitchblende and the second with carnotite, in which radio-active substances have been found. Rich telluride ores have been sawed in two—one part subjected to roasting, the other not. From the roasted ore, gold in form of drops seems to have exuded from every pore, while the ore proper appears grayish to bluish black and gives no evidence of the riches hidden therein.

On the shores of the Great Salt Lake large quantities of salt are produced by solar evaporation, and some beautiful strings of large cubical salt crystals are seen in Utah's collection. Gypsum usually occurs associated with salt, and some giant crystals, 3 feet in height, probably the largest ever unearthed, are exhibited by Utah, together with some of the celebrated Richardson radium ores.

Near Tiffany's gem exhibit, in which is the remarkable violet-colored gem kunzite, that glows so strongly when exposed to radium

emanations, we found Welsbach's exhibit of rare earths. Here is given ocular proof of the care necessary in defining an element. Didymium has long been considered an element, and you still find didymium salts quoted by large firms. Didymium nitrate is also here shown in a very large jar, and this salt has a fine rose color. Chemists have doubted that this salt contains more than one elemental substance; but, looking at the two products standing beside the large jar, their skepticism is changed to belief. For the Welsbach Company shows a neodymium nitrate differing slightly from the rose-colored mother-salt, and a leaf-green nitrate of neodymium, both having been separated from the so-called didymium nitrate. To say an element "cannot be decomposed" had better be modified to "has not been decomposed," and we will always be nearer the truth.

The bright-red banner of the rising sun is in this building, and everywhere you may go in this Fair it floats. Japan of all the foreign countries has the most complete exhibits next to Germany. It convinces us thoroughly of the great mineral wealth of the tight little islands. Of gold, silver, mercury, copper, iron, lead, coal, sulphur and oil, Japan has abundance. The large stibnite crystals, over a foot in length, are always interesting, for much of the coarser grades of this antimony ore are liquated and sent to St. Louis to be converted into antimony salts. The reader may have often lifted a small portion of the Japanese Empire behind the counter, for this country is the richest in the world in antimony.

Texas is here, and you should not miss the opportunity to take a look at the cinnabar ores of Brewster County, on the Rio Grande. This State will some day be a big producer of mercury; 1,000 pounds of the metal is shown in an iron kettle; a large cannon ball floating on the surface of the mercury convinces the public that mercury has a rather high specific gravity.

Niagara Falls is represented by the various products made by the electric current. Artificial abrasive materials, as crystallized alumina, an artificial emery, with very little diluent, as iron oxide and sand, carborundum, a carbide of silicon, with the various grindstones, hones, etc., made from this artificial substitute for emery. A case of chemicals, such as caustic soda, bleaching powder, potassium chlorate, etc., of very high purity as made by electrolysis, will be of interest to the pharmacist.

Drugs will be found in the Agriculture and Fish, Forestry and Game Buildings.

The German section gives an idea as to how land is reclaimed, the effect of various fertilizers on like soil is shown by the products obtained. Peat and the products obtained by subjecting it to dry distillation are shown, such as acetic acid, methyl alcohol, paraffine, cresol oils and ammonium sulphate.

German East Africa is tropical and abounds in drugs, such as gutta percha, rubber, copal, vanilla, tamarinds, cacao, cocoanuts, sesamé, cashew and betel nuts, archil and annatto, ginger and cinnamon.

Italy evidently intends that it will, if possible, get in on the camphor proposition, for a wall case shows many nicely crystallized samples of camphor as prepared from trees of the Laurus Camphora grown under the direction of the experiment stations.

France has mainly a wine, olive oil, mineral water and chocolate display. The associated colonies, Algiers, Reunion and Bourbon, show drugs. Algiers has evidently a bright future as a cork-producing State; bales of the finest quality are shown. Bourbon has a small case of vanilla, bottles containing the bean are studded with vanillin sublimate and the delicate odor is noticed through the locked case.

The Reunion Botanical Department has a tasty display of spices, benzoin bark used for tanning, and the peculiar jointed roots of the citronella.

Great Britain and Colonies exhibit rubber made from the juices of many spurious rubber plants, products known as "hard Ashanti lump," "soft akim," "salt pond nigger," "white krepi ball," also genuine para biscuit rubber made from the Hevea trees. Nuts, shells and the commercial article, the kernel of the palm nut and the palm oil, are represented.

Japan's breweries make a big show of the celebrated "soy;" this is a sauce much used by the Japanese. The peculiar peppermint oil so rich in menthol, and menthol in crystals of several inches in length are very prominent. Various seed oils, as rape seed; tea, tobacco, pepper, wax and honey, are of importance.

Formosa, Japan's colony, is tropical and grows spices, such as ginger and turmeric. The camphor wood, a large pagoda of pressed camphor, trade packages of camphor and safrol make up the most interesting part of this exhibit.

Ceylon is distinctly an isle of spice. Here are displayed thirty to forty different trade grades of cardamoms, also the seed and wild cardamom pods; cloves, ginger, mace, the natural nutmegs that have neither been limed nor peeled, turmeric, Ceylon cinnamon in bales, cacao, betel nuts, cocoanuts, cinchona bark, etc. The lemon grass and yellow and greenish citronella oils of many native distillers are shown, also cocoanut oil. A hundred grades of tea, and last, but not least, the far-famed delicacy, birds' nests. This exhibit might properly be called a drug merchant's sample house.

Porto Rico has the usual run of tropical produce, such as cacao, ginger (both the white and the yellow), tamarinds, cassia fistula, bay leaves, cocoanuts, rubber and annatto.

Honduras exhibits a large trunk of the rubber tree, rubber, bundles of sarsaparilla, cascarilla, in fact, a whole division devoted to many strange drugs.

Costa Rica displays fibres, woods, barks, fruits. Many bundles of india rubber, with a bottle of the latex, from which the rubber is obtained, make up a separate division. Many drugs, as cinchona, cassia fistula, pepper, ginger rhizomes, untreated and on the point of sprouting. Annato seeds in the bursting pod—imagine a jimpson-weed burr flattened and you have some idea as to the shape of the annatto pod. The seeds are red in color, very angular and somewhat larger than a mustard seed. The annatto paste is also represented.

The Fish, Forestry and Game Building is just north of the Agriculture Building; the dressed woods are most prominent, still the barks, roots, resins, etc., come in for their share of attention.

Egyptian Soudan is the home of gum arabic and all qualities and forms of this drug are shown, also rubber, sesamé and ivory tusks. Most interesting is a sample of common salt made from the saline earth found in the Soudan; the color is grayish white. It comes in forms indicating that in the moist state the salt had been packed in horns.

The Siamese evidently hold drugs of secondary importance; samples of gum benzoin, gamboge, dammar, unpeeled sticklac and india-rubber are placed high up in a dark case.

Ceylon has a trader's case of tanning materials such as myrobalans and cashew nuts, acacia and cinnamon barks, rock alum; also flour made from the sweet potato, plantain, cassava and tapioca. The deadly cobra is shown in the jungle scene.

Japan has a many-sided fish industry, the modes of fishing pursued, the smacks and products, make an interesting exhibit. Several dozen different kinds of fish oils such as herring, cod-liver, sperm, whale and sardine oils are made by the Japs.

Venezuela, among a hundred odd drugs, shows copaiba oil, vanilla, asphalt, copal, kola, cusparia, divi-divi; also the extract, cinchona and simaruba. A peculiar turtle oil that has a buttery consistency and color is among the oddities; a root called "Flamesco" is said to be used in syphilis.

Brazil has a large collection of barks as used in the tanning of leather. The many barks, seeds, etc., used in that country for medicines, and to which not much attention is paid outside of that country, are shown.

Georgia, noted for several centuries as the home of naval stores, has a handsome exhibit in this line. The mode of tapping the pine, the tools used, the big copper stills, worms and containers employed in the turpentine industry are instructive. A hundred trade-brands of resin, resin oils, spirits as used for various purposes are shown.

In the Liberal Arts Building French, English and American chemical manufacturers are represented by elegant exhibits, many of which are characteristic. The production of finely crystallized and consequently very pure compounds is the rule. The industries represent all phases of the chemical technology.

The South Metropolitan Gas Company, of London, S. W., shows the relative amounts of the various products obtained by the fractional distillation of gas tar. Such are benzol, toluol, cresols, naphthalin, anthracene, pitch, etc.

The British Cyanides Company exhibits beautifully crystallized and very transparent prussiate of soda; this salt crystallizes somewhat larger and has a somewhat paler tint than the corresponding potassium salt here also shown.

R. & J. Garroway have an assortment of the sulphates: ferrous, soda, alumina; also large blocks of sal ammoniac are shown.

The tropical cocoanut is worked up by J. Crosfield & Sons, of Warrington, England, select samples of coprah beans, coprah hulls, butter, layers of the press cake sold as cattle food; also the prepared edible butter colored yellow.

Soda and sodium silicate as made by Loewig's process are shown.

The silicate resembles broken glass fragments, having a bright surface and of a greenish to brownish color.

Grove & Co. and Hill & Co. have a case showing sulphur, glycerine and ammonium carbonate. The ammonium carbonate is a very large chunk, and the separate glass receptacle is coated with a fine sublimate.

The Brewer's Supplies are represented by Collet & Co. and Kendall & Sons; these exhibit the sulphites such as the magnesium salt, butyric and valeric acids, the beer color sucrosan, etc.

The United Alkali Works and Bruner, Mond & Co. show the alkali for which they are noted; the celebrated Mond nickel goods are also here.

Cordite explosive in long thin sticks, resembling very dark-colored Ceylon cinnamon, and the various form of shell used with this explosive, make an interesting case. Picric acid is one of the constituents of this terrible explosive.

That England is still on the map so far as the manufacture of artificial dyes from coal tar is concerned, is strikingly shown by the Levinstein Ltd. exhibit. These people have books of colored stuff, showing the value of dyes, also the dyes. A few bottles of Naphthylamine labeled, 4,000,000 pounds annual production, nitronaphthalin, 5,000,000 pounds, and other bottles with similar labels, are shown. As these products are only used as starting materials for the many modern fast dyes, an idea of the vast production is implied.

What will interest the pharmacist the most are the utensils used over a hundred years ago by pharmacists, old oxymel jars, and oil bottles of porcelain, looking more or less like tea-pots or squat wine decanters, quaint iron and bronze mortars, the various helms, retorts and adapters, reminding one of old alchemistic prints, etc. Messrs. Corbyn & Stacey have brought these over.

Perfect alum crystals in large regular octahedræ, as made by Peter Spence & Son, fill two large cases. Thallous, ferric, caesium, chromic, rubidium, sodium and potassium alums in perfect 3-inch crystals are prominent. Isomorphism of the alums is finely demonstrated by growing potassium alum over chrom alum, and vice versa, also iron alum over potassium alum. In Ostwald's "Inorganic Chemistry" it is stated that soda alum does not exist; looking at the fine soda alums shown here, one is convinced of the contrary.

The mineral started with is bauxite; extracting the alumina from this leaves a brownish residue, containing among other substances titanium. The various salts of this commonly regarded rare element are prepared in commercial quantities by this same firm. Twine and yarns mordanted with these salts and then dyed present a peculiarly high gloss, *e.g.*, cotton twine has been so treated.

There are many other manufacturers in this British section, representing the usual run of fine chemicals, but we have not the space to analyze them in this letter.

Research work done at Owens College (now Victoria University) by Professor Schorlemmer on Pennsylvania petroleum many years ago is of historical importance, also the zinc ethyl made by the celebrated Frankland. Most interesting is Sir Henry Roscoe's conclusive work, showing that the then held elemental vanadium was in fact an oxide of this element. The various chlorides and oxides of this element show striking colors; the solutions of the sesquioxide is green, the dioxide is greenish-blue, the tetroxide is deep blue, and the common pentoxide is yellowish. The pentoxide is also shown in large prisms, their color and appearance remind one of permanganate of potassium.

The Wellcome Research Laboratory shows the many beautiful products isolated from plants under Professor Power's direction. The exhibit is very tasty and elegant in appearance. Hundreds of compounds in small watch-glasses and vials show what has been accomplished in the last few years by this enterprising firm of Borroughs, Wellcome & Co. Both Professor Power and Mr. Wellcome were students of the Philadelphia College of Pharmacy, and Americans.

France got here a little late, and as a result is somewhat behind in its installation; but, from what I can see, will have an elegant display of pharmaceuticals and chemicals. Poullenc Frères, of Paris, show finely crystallized samples of potassium iodide, iodoform, sulphates of nickel, etc. Over a pound of metallic lithium in sticks, boron and silicon crystallized, a calcium-aluminium alloy of silvery appearance are among the more uncommon in this exhibit—the only one installed at this writing.

The Mallinckrodt Chemical Works are located near the British chemists, and make a very fine showing. The morphine, ether and cocaine, for which the firm is noted, find prominent places in

the large display of fine chemicals exhibited. The most unique is the group of cocaine crystals, many of which are over 3 inches in length. The firm's initials are done in crystals of terpinhydrate.

In the Electricity Building, as stated, will be found the German chemical exhibit. The Germans have intended to make this an educational exhibit, and commercialism had to take a back seat. The individual firm is not in evidence as in the British section. All firms have pooled their interests, and make a great display where duplication of same subjects is unknown. They have succeeded remarkably well.

The time when chemists worked in the dark cellars and were more or less associated with the Evil One by the ignorant populace, is shown by actual utensils of an alchemist's laboratory as borrowed from the great Nürnberg collection of things alchemistic. In a dark cellar-like grotto, we see the walls and ceiling hung with crocodiles, salamanders, snakes, turtles and the like. Old-fashioned furnaces, with retorts of a peculiar green glass and with helms of the same material, and also adapters and receivers of various forms, show with what these active workers performed the operations of distilling. On the floor are spread ores and gangues as found in Freiberg. Old works of the period are found in the general library of the exhibit.

Opposite the alchemist's laboratory is that of Liebig's at Giessen. Here are the long-armed balances he used, the furnace and bulbs used in combustion analysis that bear his name. The many compounds prepared in the Giessen laboratory during his stay, are arranged along the walls. In looking at the little Liebig had to work with, and contrasting that with what is found in many of the State institutions, it is forcibly brought home that some men may do much with very little, and they that have very much seem to do little.

Synthetic perfumes in pint bottles, such as ionone, rose, etc., an entire case of so-called synthetics, many fine inorganic compounds, thousands of dyes and the various organic compounds of technical or theoretical importance, make up a large part of the exhibit.

Historical work is illustrated by samples of that extremely rare element, Germanium, as separated by the celebrated Freiberg chemist, Clemens Winckler.[1] Also the first contact appliance for

[1] We have almost as fine a sample in our own collection—a present from Winckler.

the preparation of sulphuric acid without the use of the large reaction chambers of the old method is shown by the same chemist. The first indigo as prepared by Baeyer is here as a minute sublimate of blue in a broken test-tube.

Ostwald's appliances, balances of precision, thermometers, gas-measuring burettes, appliances for working with liquefied gases, electric furnaces, Jena glassware, royal porcelain, and in fact almost anything that a chemist might occasionally use in the line of apparatus is shown.

Haereus shows his molten quartz apparatus. Small tubes, retorts, crucibles, flasks of thin quartz are blown by glassblowers, the only difference being that with glass a smoother finish is obtained than with quartz. These quartz goods may be heated to a white heat and plunged into cold water without cracking.

Goldschmidt's thermite has a separate case. Thermite is a mixture of the metallic aluminum in powder with an oxide of a metal, say iron; on causing a sudden ignition of the mass by a spark from the so-called Zündkirsche, iron free from carbon is produced in the molten state, while alumina is the product of combustion. Many metals as uranium, tungsten, chromium, that are with difficulty produced by other operations, are readily produced in like manner, in a molten state, and in large quantities.

THE NEW MEDICAL LABORATORIES OF THE UNIVERSITY OF PENNSYLVANIA.

The ceremonies connected with the dedication of the new laboratories of pathology, physiology and pharmacology of the University of Pennsylvania, on June 10th, were not only of great general interest, but the event was one of the most important in the history of the University, and has a direct bearing upon the practice of medicine and pharmacy in America.

"The last quarter of the nineteenth century witnessed the conversion of the teaching and practice of medicine from a theoretical to a practical and demonstrative basis. This momentous change, than which nothing more revolutionary and beneficent has been achieved in the history of the intellectual development of the race, has been the result of the establishment of laboratories in which research in medical science might be conducted. By means of the facilities

offered in these laboratories, workers have not only enormously increased our knowledge of the structure and functions of the human body, and of the nature of disease, but have also provided methods which have already robbed some of the most direful pestilences of their chief terrors. Hitherto America has scarcely kept pace with foreign countries in provision for scientific study in medicine and in incentives to its prosecution. While this aspect of medical education has not been wholly disregarded in this country, the limitations placed upon institutions of learning by their inability

The New Medical Laboratories of the University of Pennsylvania.

to provide adequately out of their means for the support of laboratories has had a detrimental effect upon the growth of American medicine. In other countries the national and municipal governments have done what in this country is left to the accident of private inclination and beneficence.

"In view of these contingencies, the University of Pennsylvania has constructed a new medical laboratory which was formally dedicated on June 10, 1904. In completeness of equipment this new building is without a rival. It provides for the teaching of students and the carrying on of research work on physiology, pathology and phar-

macology, in which departments of medicine the greatest advances have been made in the past, and may be predicted for the future.

"The opening of these laboratories is not simply of local but of national interest. The construction of the building has occupied about four years, and has cost, exclusive of its ground and equipment, in the neighborhood of $700,000. The erection of a new medical hall, an anatomical building and auxiliary buildings, adjoining the building dedicated, is also contemplated in the near future. These with the present hospitals and clinical laboratories will form one of the most extensive systems of buildings devoted to the teaching of medicine in Europe or America.

"The new building is quadrangular in shape. It is located on the south side of Hamilton Walk, between Thirty-sixth and Thirty-seventh Streets, on the site of the old Veterinary Hall and Hospital. The building is two stories in height above a high basement, and measures 337 feet in front by nearly 200 feet in depth. The long front faces north, securing a maximum amount of the best light for laboratory purposes. Along the front are arranged small rooms for research, offices for professors and assistants and similar purposes. These open into private corridors, so that those employed in these rooms may pursue their work without interruption from those passing through the main halls.

"Perfect lighting of all the laboratories has been obtained, the size of the courts and the height of the front building insuring good north light to the laboratories of pharmacy and pharmacodynamics on the first floor, and to the large laboratories on the second floor devoted to pathology, where microscopic work is to be done—the north front of these rooms, facing on the courtyard, being almost wholly of glass and extending higher than the front, so that steady north light will be thrown to the back of the room.

"The basement rooms are also well lighted. Here will be located locker, recreation and toilet-rooms for the students, janitor's quarters, rooms for practical instruction in physical diagnosis and bandaging, rooms for sub-section teaching in physiology, store-rooms, research-rooms, etc.

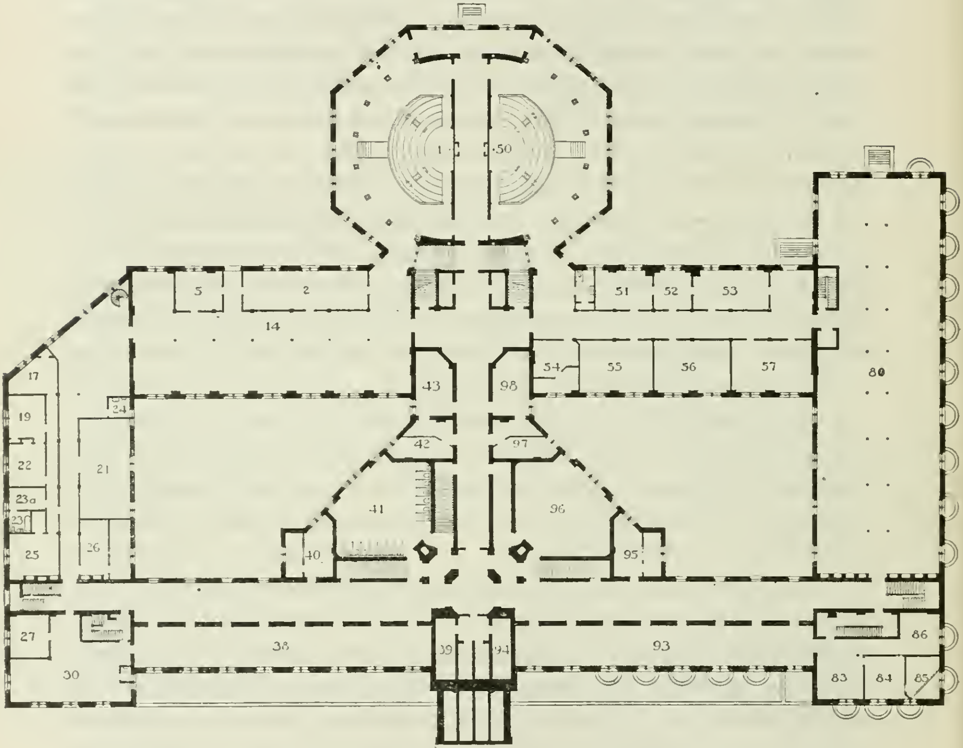
"The first floor of the new laboratories is to be devoted to physiology and pharmacodynamics. The department of physiology on the first floor will have provided one large room, in which there will be ninety cabinets fully equipped with such apparatus as is required

in the practical exercises in physiology carried on by the students. Three rooms have been especially constructed and equipped for aseptic operations on the lower animals, one of them being a preparation room for the operators, another a preparation room for the animals and another for operating. These will be equipped with the most modern appliances, so that operations may be carried on under the most favorable conditions known to modern surgery. In the north front are a number of small rooms which have been set apart for the instructor and his assistants for instruction in advanced physiology, etc. A well-equipped shop has been provided for the construction and repair of apparatus. In the east wing are a number of rooms for sub-section instruction in special departments in physiology—digestion, circulation, respiration, calorimetry, nerve-muscle, special senses, etc., respectively. There has also been provided a photographic dark-room and an adjoining room for projection and other optic apparatus of the greatest importance in the making of diagrams, charts, lantern slides, etc.

"The department of pharmacology has also been provided for on the first floor. This contains a large laboratory for practical pharmacodynamics, a large laboratory for practical pharmacy, a museum, a library and various rooms for the instructor and his assistants for research work, etc.

"The second floor will be devoted exclusively to pathology, with temporary accommodations for a number of the professors of other departments until the completion of future building operations, rendering possible the final transfer of the entire medical school to buildings adjacent to the present new building. An examination of the plans will reveal the general purposes of the floor. Aside from the provisions for lecture-rooms, the chief purpose of the plan of operation and construction looks to laboratory instruction. The entire north front of the building (with the exception of the temporarily arranged private rooms for various professors and the general pathological office) is devoted to laboratories for advanced students in experimental pathology and pathological bacteriology and the special research and assistants' rooms. The east wing accommodates the laboratory of advanced pathological histology and a seminar and journal room; the west wing is occupied by the pathological museum, the gross morbid anatomy demonstration room, a room for museum preparation, photographic rooms and rooms for

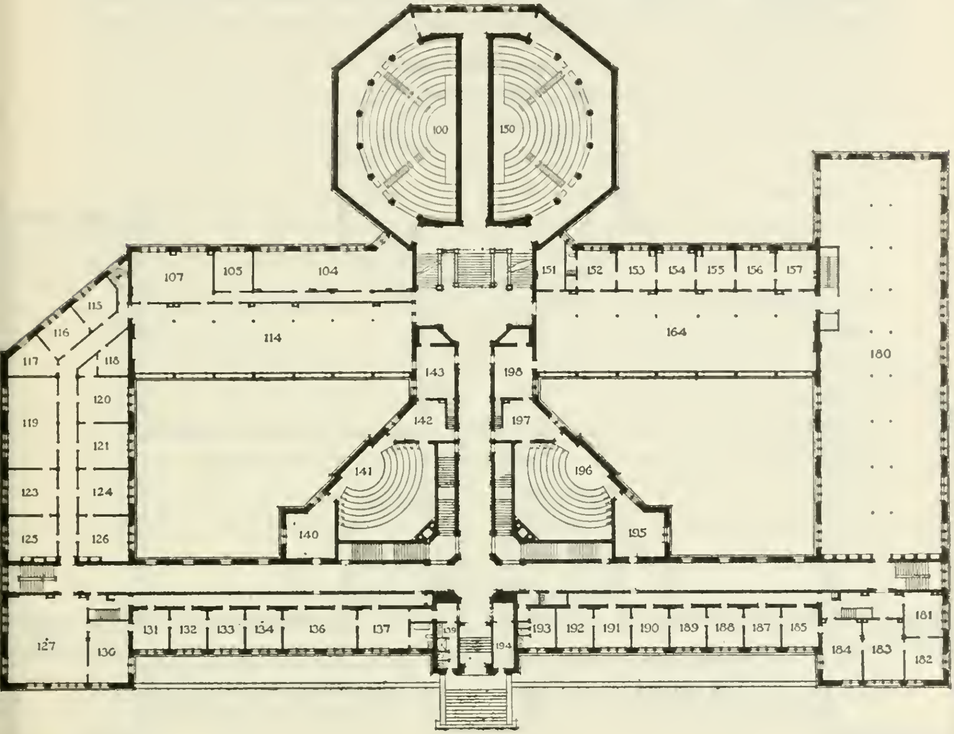
animal operations. The museum and gross morbid anatomy demonstration rooms are in close proximity to the large class laboratory of pathological histology in the west end of the southern part of the building with the important aim of closely relating the instruction carried on in each. This last laboratory, that of pathological his-



PLAN OF BASEMENT.—1 Bottom of Amphitheatre. 2 Materia-Medica Museum. 5 Instructor's Room. 14 Students' Recreation Room. 15 Students' Locker. 17–19–22–23–25 Janitor's Quarters. 21 Dynamo Room. 26 Fan Room. 27 Buffer and Grinding Room. 30 Motor Room. 38 Sub-section Teaching, etc., in Physiology. 39 Alcohol Store Room. 40 Fan Room. 41 Toilet Rooms. 42 Pathological Preparation Room. 50 Bottom of Amphitheatre. 51 Research Room. 52 Repair Room. 53 Storage Room. 57 Pathological Store Room. 80 Physical Diagnosis, Bandaging, etc. 83 Store Room. 84–85 Fan Rooms. 86 Store Room. 93 Department of Physiology. 94 Pathological Store Room. 95 Fan Room. 96 Class Room.

tology, the front of which consists almost entirely of glass, is located so as to face a spacious court to the north, thus insuring excellent and uniform light, and admirably adapting it for microscopic work carried on by a large class. In a similar section of the building, east of the central hall, with similar front arrangements to ensure light

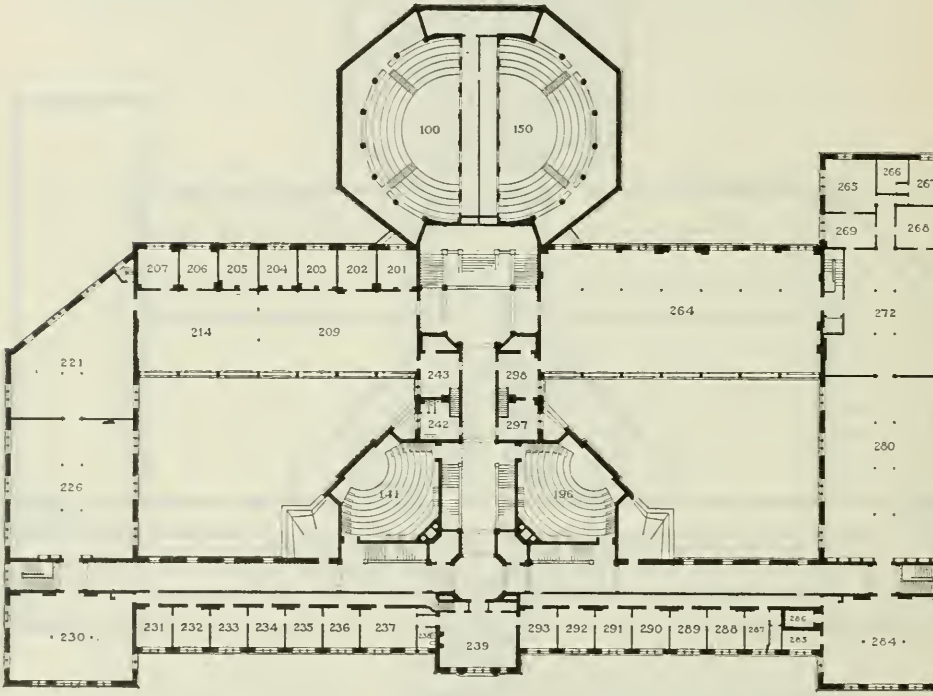
for microscopic work, are located two smaller laboratories to be employed in the teaching of surgical pathology, neuropathology and



First Floor Plan.—100 Amphitheatre. 104 Library. 105 Instructor of Pharmacy. 107 Storage Room. 114 Laboratory of Pharmacy. 115 Operator's Preparation Room. 116 Operating Room. 117 Animal Preparation Room. 118 Dark Room. 119 Respiration, Calorimetry. 120 Optical. 121 Circulation. 123 Nerve Muscle. 124 Digestion. 125 Special Senses. 126 Chemical. 127 Construction and Repair Shop. 130 Tinker Shop. 131 Seminar and Conference Room. 132–133 Advanced Physiology. 134 Assistant to Professor of Physiology. 136 Laboratory of Professor of Physiology. 137 Study of Professor of Physiology. 139 Toilet Room. 140 Pharmacodynamic Preparation Room. 141 Demonstration Room. 142 Pathological Preparation Room. 143 Professor Duhring. 150 Amphitheatre. 151 Storage Room. 152 Prof. H. C. Wood. 153 Weighing Room. 154 Chemical Room. 155 Research Room. 156 Research Room. 157 Dr. H. C. Wood, Jr. 164 Laboratory of Pharmacodynamics. 180 Students' Laboratory for Practical Exercises in Physiology. 181–182 Assistant Professor of Physiology. 183 First Assistant in Physiology. 184 Second Assistant in Physiology. 185 Third Assistant in Physiology. 187 Research Room. 188 Reading Room. 189 Library of Physiology. 190 Dean's Office. 191 General Office and Waiting Room. 192 Clerks' Office. 193 Ladies' Toilet Room. 194 General Information Bureau. 195 Physiological Preparation Room. 196 Demonstration Room. 197 Physiological Preparation Room, (Dental, Veterinary and Biological).

clinical pathological technology, and private rooms for the instructors in these branches are arranged to open upon these large labor-

atories. In order to provide for special occasions when a larger body of men are likely to require temporary accommodations than is ordinarily contemplated in either of these laboratories, it has been arranged that a movable partition may be withdrawn so as to throw



SECOND FLOOR PLAN.—201 Research Room. 202 Gynæcological Pathology. 203–204 Surgical Pathology. 205 Clinical Pathology. 206–207 Neuro-Pathology. 209 Surgical Pathological Laboratory. 214 Neuro-Pathological and Clinical Pathological Laboratory. 221 Seminar and Journal Room. 226 Advanced Pathological Histology. 230 Experimental Pathology. 231–236 Research and Assistant's Rooms. 237 Prof. A. J. Smith. 239 Pathological Office. 141–196 Demonstration Rooms. 242 Toilet Room. 243 Microscope Room. 264 Pathological Histological Laboratory. 265 Operating Room. 266 Photographic Dark Room. 267 Photographic and Drawing Room. 268 Museum and Preparation Room. 269 Operating Room. 272 Gross Morbid Anatomy. 280 Museum. 284 Pathological Bacteriology. 285 Sterilizing Room. 286 Dark Warm Room. 287 Refrigerator and Distilling Room. 288 Professor Tyson. 289 Professor Hirst. 290 Professor de Schweinitz. 291 Professor Clark. 292–293 Research Rooms. 297 Store Room. 298 Section Room. 3d floor of tower, Artists' Room. 4th floor of tower, Professor of Pathology.

the two rooms into one. In addition to the above apartments a number of small rooms devoted to storage or special technical work are provided upon this floor or elsewhere in the building in connection with the general chair of pathology.

"Besides the numerous laboratories, research rooms, etc., there are two demonstration and two lecture rooms in the building. The two demonstration rooms each seat 185 students. These rooms communicate with two preparation rooms each. At the rear of the building there are two large lecture rooms, each seating 400 students. Students enter these rooms from a landing at the main stair, midway between the first and second floors. The floors of the lecture rooms are on a level with the basement, and the lecturer will enter directly from the basement level, and all specimens needed to illustrate the lectures will be brought through this entrance, thus saving the crossing of the halls through which classes move.

"The most modern apparatus has been installed for light and heat and ventilation."

The formal exercises transferring the new laboratories to the University were held at 4 o'clock, and were imposing and dignified, and in every way fitting the occasion. There was a large attendance of representative and professional men, including members of the American Medical Association, who came by special train from Atlantic City, where they were convened in annual session. In the absence of the chairman of the Committee on Medical and Allied Schools, Dr. S. Weir Mitchell, the duty of making the presentation devolved upon J. Vaughan Merrick, one of the oldest trustees of the University, who spoke of the growth of the Medical School during the past thirty years, it having at the beginning of this period a single building on Ninth Street. In accepting the new laboratories, Dr. Charles C. Harrison, Provost of the University, said in part, after referring to the ideals and purposes had in mind in the construction of this building: "This great building bears no one person's name, and is the result of no single benefaction. It has been built up, rather, by numerous gifts, memorials and offerings, so that many hearts are turning toward this place to-day, and will rejoice with us all when I announce that no shadow of debt falls upon the new medical laboratories of the University of Pennsylvania."

Then followed addresses by eminent medical men from four of the leading universities of the United States, which we are able to publish in part.

TEACHING OF PHYSIOLOGY IN MEDICAL SCHOOLS.

By Dr. H. P. Bowditch,
Professor of Physiology, Harvard University.

In bringing the congratulations of a sister institution on the occasion of this important step taken by the University of Pennsylvania in the advancement of medical education, it may, perhaps, be appropriate for me to dwell upon the proper relation of the sciences, so sumptuously installed in these new buildings, to the general work of medical education.

With regard to the methods employed in giving instruction in physiology, the great change which has recently taken place in all our large medical schools cannot fail to strike even the most superficial observer. This change, which has been quietly going on for the last ten or fifteen years, consists mainly in the great development of the laboratory method of instruction. This is but a logical result of clearly apprehending the fact that physiology is merely the physics and chemistry of living matter and of applying to that science the methods of instruction already adopted and approved by the physicist and the chemist. The extension of the laboratory method is, however, also to be regarded as a reaction against the too exclusive use of the so-called didactic method of instruction, as a result of which students, getting their knowledge wholly from lectures and text-books, often failed to realize that physiology is just as truly an experimental science as either physics or chemistry, and were thus insensibly led to depend upon authority instead of upon the direct observation of nature.

Of the great educational importance of this reaction and of the changed attitude of the student-mind determined by it there can be but one opinion. Whether we consider that the most important object of medical education is to "train for power" (to use President Eliot's phrase) or regard the imparting of information as the chief end to be sought, the laboratory method has distinct advantages over all other methods. Contact with the phenomena themselves and not with descriptions of them trains the mind of the student for power by teaching him to observe carefully and reason correctly, while, as a means of imparting information, the laboratory method has the great advantage of giving the best of all knowledge, viz., that which comes from personal experience. So valuable to the physician is the habit of mind thus cultivated that it may well be

doubted whether any preparation for a medical career is better than that afforded by a physiological laboratory. There are, of course, many physicians of the highest rank who have not enjoyed the advantages of a laboratory training, but they will, I think, all be found to have habits of accurate observation and careful reasoning, mental qualities which it is the special function of the laboratory to foster and cultivate.

Having thus borne testimony to the value of the laboratory method, let me ask you to consider the limits, if any there are, to the application of this form of instruction.

The most superficial examination of the question makes it clear that laboratory methods are extremely costly both in time and money, and that there are, in all the medical sciences, many subjects which cannot well be taught in this way.

It is thus evident that a considerable portion of the instruction in physiology must be given by didactic methods, simply because this is the only practicable way of imparting necessary information. The ignorance of a young practitioner called to his first case of diabetes would scarcely be excused on the ground that he was "trained for power," and that there were no experiments on glycogenesis in his laboratory course in physiology.

In this connection it will be well to inquire how far didactic methods of instruction afford opportunities for mental training, and here I shall be compelled, I fear, to take issue with those of my professional brethren who regard text-books and lecture-room instruction as essentially lifeless in their character. It seems to me, on the contrary, that the best lecturing is often the source of a distinct mental stimulus, for, as Dr. Mitchell has well said, it "does not so much think for you as invite you to think along suggested lines of inquiry."

In every department of medicine advanced instruction necessarily deals with subjects which lie within what Foster has called the "penumbra" of solid scientific acquisition, and about which conflicting views are therefore certain to be held. It is in inviting thought with regard to the evidence an experienced lecturer has his best opportunity to train the minds of his hearers. Other opportunities are also afforded by the historical presentation of subjects, about which differences of opinion no longer exist, for there are few things more instructive than to follow up step by step the lines by which

our knowledge has advanced, noting the marks which distinguish the paths which have been trodden successfully from those which have turned out to be "no thoroughfare." Even better opportunities for mental training than those which the lecture-room presents are afforded by the recitation, for here the minds of the teacher and the pupil are brought most closely into contact, the pupil's difficulties are appreciated by the instructor, and the point of view of the teacher can be learned by the pupil. It has always seemed to me that no higher enjoyment falls to the lot of the teacher than that which he experiences when, by a series of carefully considered questions, he leads his pupil onward from the known to the unknown, and notes the gleam of intelligence which illumines his countenance as a subject, previously obscure, becomes clear, as a result of his own mental operations guided by his teacher's skillful questions. It thus appears that no monopoly of opportunities for mental training can be claimed for the laboratory method of instruction, while, for the purpose of imparting necessary information, laboratory work must, for reasons just given, be supplemented by didactic instruction.

Recognizing, therefore, the importance of both the laboratory and the lecture room as educational agencies, let us consider what should be their relation to each other. The question is often formulated thus: Shall the experiments illustrate the lecture or shall the lecture explain the experiments? If forced to decide between these alternatives, I confess that I should be inclined to choose the latter, for, by giving precedence to the experiments, the teacher conforms his instruction to the law of growth of an experimental science. There are, however, many departments of physiology in which the experimental data suited for elementary laboratory instruction bear so small a proportion to the sum total of the knowledge which must be imparted to the student that the didactic instruction necessarily assumes the more important position and the lectures cannot, without a forced use of language, be described as explanatory of the experiments. It seems to me, therefore, that the wisest course at the present time is not to attempt to decide between the two abovementioned alternatives, but to let the method of instruction vary with the subject.

In thus classifying physiological subjects according to the methods best suited for teaching them, it must be borne in mind that such a

classification must necessarily be preliminary and tentative, and that improvements in laboratory technique will often result in transferring certain subjects into that class in which the student has the inestimable advantage of direct personal contact with the phenomena to be studied. Indeed, there is nothing more encouraging to those who are engaged in working out these educational problems than the discovery that medical students, under proper instruction, can be safely trusted to employ the most refined methods of physiological research. Thus in the Harvard Medical School capillary electrometers have been manufactured by the hundred and used successfully by first-year students.

It seems to me, therefore, evident that the reaction against purely didactic methods of instruction is a movement to be heartily welcomed; but, like all other reforms, it should be carefully guided, lest useful as well as useless things be swept away. It should be borne in mind that it is quite as possible to abuse the laboratory as the didactic method of instruction, and that, in all schemes of education, a good teacher with a bad method is more effective than a bad teacher with a good method.

THE LATENT POWER IN, AND THE INFLUENCES EMANATING FROM, THE LABORATORY.

By Prof. R. H. Chittenden,
Director of the Sheffield Scientific School, Yale University.

Where could be found a more striking, more convincing demonstration of the great advancement made of late years in the development of the scientific branches of medicine than the present laboratories afford. So long as medicine and the related sciences were crude and inexact, so long as our knowledge was based mainly upon theories and hypotheses of doubtful origin, and still more questionable value, the laboratory counted for little. As scientific knowledge advanced, however, and it gradually became apparent that true progress was to be made only, or mainly, by actual observation and experiment, the laboratory became the field of work, and there gradually came full recognition of the necessity for practical study of the many questions that were constantly arising for settlement. No longer satisfied by the dogmatic statements of the earlier writers, thoughtful people began to ask for facts and demonstration, and the laboratory and its facilities grew side by side with a growing craving

for exact knowledge. Laboratories, such as we see before us to-day, testify in no uncertain language to the development of methods of exact study, and the fact that there is need of such facilities as a part of the equipment by which students are to be trained in the science and art of medicine testifies more fully than any words can do to the enormous advance that has taken place in the evolution of scientific medicine and in the consequent development of medical education. To pass through these laboratories, which are to-day thrown open for inspection, inspires one not only with admiration, but also with a full appreciation of the increased facilities for scientific work afforded, and with the fact that our knowledge has grown to such proportions that there is need of this practical exposition in teaching. In other words, we see in these commodious laboratories clear demonstration that medicine has truly become an exact science.

The laboratory is the foundation stone upon which is to be reared our temple of knowledge, and we do wisely when we build this foundation large and broad, a fitting support for a structure that shall tower aloft, casting abroad over the land a light bright enough to pierce the darkness of superstition and ignorance, and shedding a ray of hope for the relief of the afflicted and for the betterment of mankind. The laboratory, when under the supervision of a wise leader, properly trained and alive to the importance of what a true laboratory should provide, becomes to the student a revelation and an inspiration. Here he sees, perhaps for the first time, how true knowledge is gained, how facts are acquired, and he learns to observe, to see for himself those mysteries which, when described even by the words of a master, appear vague and indefinite. In the laboratory, however, he is brought face to face with nature, and not only does he acquire knowledge of nature's ways, but, what is of even greater importance, he begins to learn something of himself, of his own powers of observation, of his own ability as an observer and interpreter of what nature has to show him. Gradually there creeps over him a confidence in himself; he begins to feel free and independent; he is no longer a slave to his text-book, no longer an unreasoning believer in the printed statement of the highest authority. Like Vesalius of old, who, following venerated custom, tried to believe Galen rather than his own eyes, he is ready to throw to the winds the writings of others and to believe what he has himself seen.

This is what the laboratory, when made proper use of, does for the student of medicine. It helps him on to man's estate, to the freedom of intellectual supremacy; it leads him into the field of logical reasoning; it teaches him to see and to think for himself. It affords that training which leads to the development of the wise and skillful practitioner of medicine.

Finally, to the exceptional mind, to him in whom burns the unquenchable fire of genius, the laboratory provides the means by which discoveries of the greatest importance are brought to light. It may be a matter of purely scientific or theoretical interest. On the other hand, it may be a matter of the greatest practical importance; but, whether the one or the other, knowledge is broadened and the world is enriched by a new fact added to the sum of human wisdom. And so I congratulate you, of the University of Pennsylvania, upon these new laboratories which promise so much for the dissemination of true knowledge, and which hold out the hope of increased enlightenment on many dark chapters which still confront us as we look through the volumes which contain our knowledge of the structure and functions of the human body. And what is your gain is also our gain and the gain of the whole world, for science knows no boundaries, and a new fact, full of import for health or disease, once brought to light, becomes the property of the world and casts its blessing upon all. May these laboratories fulfil your highest expectations and constitute a never-failing power for good in the University and in the community at large.

It has been said that medicine, like Janus of old, in a good sense, bears a double face. On the one hand, she is an empiric; on the other a scientist—and science is ever rendering the practice of medicine more rational, more scientific. To-day medicine stands closely interlocked with science. It is a truism to say that the student of medicine must have training in those underlying biological sciences which are so essential for the true understanding of vital phenomena. As Professor Sherrington has well expressed it in a recent address, it is "necessary that the man go forth from his school equipped not only with the present applications of science to disease, but so possessed of the root principles of the sciences adjunct to medicine that he may grasp and intelligently use the further developments of scientific medicine after he is weaned from his instructors and the school. . . . What truer safeguard can a man have—alone, it

it may be, and isolated from the centres of knowledge; what truer safeguard can he have against all the pseudoscientific quackeries of the day than some real knowledge of the principles of the sciences along whose lines the discoveries of medicine must develop?" And we may ask ourselves the question: Is there any one science to-day which promises more aid (direct and indirect) to the science and art of medicine than physiological chemistry? Surely, we have not only the promise, but the fulfilment of the promise, in the many discoveries which have come of late years from the various laboratories of physiological chemistry scattered throughout the world, and if we grant the truth of this contention, then certainly we must admit that physiological chemistry is destined to play an important part in the development of medical education, since it is adding continually new discoveries which bear directly upon our knowledge of physiological and pathological processes, as well as discoveries which bear directly upon the art of medicine. Surely, there can be no clear or profound knowledge of abnormal or pathological processes without a thorough understanding of the normal processes of the body. The physiological must be clearly comprehended before we can intelligently unravel the pathological, and at almost every turn in physiology—in the study of normal function—we come in contact with some phase of physiological chemistry. The chemical processes of the body are indeed manifold, and it would be a one-sided physiology that attempted to explain the processes of the body without recourse to the aid furnished by physiological chemistry.

The laboratories of physiological chemistry have indeed been fruitful sources of knowledge. In them, under the guidance of masters of their science, truths have been demonstrated that have contributed no small share to the development of modern scientific medicine, and the development of medical education has been influenced in no small degree by the brilliant discoveries that have been inspired by the master minds of this particular science.

Consider, by way of illustration, the Strassburg Laboratory of Physiological Chemistry during the active life of Felix Hoppe-Seyler. Coming to Strassburg from Tübingen, in 1872, Hoppe-Seyler gradually created there an institute which attracted students from all parts of the world, and up to the time of his death, in 1895, there was a never-ending series of important papers in physiologi-

cal chemistry, many of which have left an indelible imprint upon scientific medicine.

It would be a mistake, however, to assume that the influence of the Strassburg laboratory was limited to these scientific discoveries, valuable though they were and still are. It is only necessary to mention the names of two well-known physiological chemists, viz., Baumann and Kossel, at one time students in the Strassburg Laboratory, to understand the nature of this other influence which was constantly exerted during the lifetime of Hoppe-Seyler, and is still exerted by his illustrious successor, Professor Hofmeister. In Baumann and Kossel, as students and assistants in the Strassburg Laboratory, were found the exceptional minds ready to profit in highest degree from the instruction and inspiration provided. The smouldering fire of genius was fanned into flame, and two more physiological chemists were started on their way as teachers and investigators in their chosen field. One, as professor at the University of Freiburg, lived long enough to make his name known wherever physiology and medicine are recognized as experimental sciences. The other, as professor at Marburg and now at the University of Heidelberg, is at the height of his career as one of the foremost physiological chemists of this generation, adding each year some new fact to our store of knowledge of physiology and experimental medicine.

Such, briefly depicted, is the character of the influences that may emanate from a single laboratory, and I would use the illustration in a two-fold manner. First, to indicate the enormous latent power in a laboratory of any kind, properly equipped and wisely conducted, for the judicious training of students and for the discovery of important scientific truths—a power to which there is almost no limitation. Second, to indicate the intimate relationship which unquestionably exists between physiological chemistry and scientific medicine. Finally, as an ardent believer in the growing importance of physiological chemistry as a means by which many of the intricate problems which to-day confront us in the science and art of medicine are destined to be unraveled, I venture to prophesy that in the development of medical education, in harmony with the advance of medical knowledge, physiological chemistry will be found to occupy a more and more conspicuous position.

THE DEVELOPMENT AND IMPORTANCE OF PATHOLOGY.

By Dr. George Dock,
Professor of Medicine, University of Michigan.

It is hard to believe, but none the less true, that when this school was founded, 140 years ago, medicine was but little in advance of its condition 2,000 years before. In the long interval medical knowledge had traveled in circles, never getting very far beyond the elementary pathological and clinical facts known in the age of Pericles.

In the five centuries between Hippocrates and Galen there was no progress at all, and for nearly fifteen hundred years Galen and Hippocrates, with Aristotle, were deemed as infallible in medicine as the Fathers of the Church were in theology. Sydenham, inferior to the Greek and Roman masters in breadth of knowledge, was the first to apply the new principles of Baconian philosophy in medicine, and Sydenham's life was separated from that of John Morgan, the father of the Medical Department, by less than fifty years. Though the scholars of the Renaissance had shown that the Greek and Roman texts used through the Middle Ages were sadly corrupted from the originals, and though dissection of the human body was practiced in the fourteenth century by Modino and Guy of Chauliac, it was not until the genius of Vesalius dawned (1514–1564) that the first severe blow was given to Galen's authority. About the same time pathological anatomy began to be cultivated, but the early observations were devoted chiefly to monstrosities and other apparently miraculous formations, and had little more relation with pathology than the stones collected by a small boy have to geology. The need of more rational methods was clearly stated by Bacon ("Of the Advancement of Learning." Book IV, Chap. 2), who urged the study of case-histories, the cultivation of morbid anatomy and of vivisection of animals. The revelations of Harvey were essential to the ultimate development of pathology, but the first application of physiology, as the first application of physics and chemistry to pathology, caused confusion rather than enlightenment. Medicine had gathered in its course through the dark ages so much rubbish, such as magic, astrology, polypharmacy, the doctrine of signatures and all manner of mystic beliefs that still survive to vex the impatient, that it could follow but slowly the steep path of dis-

covery. Pathology consisted of dogma after dogma, system after system, each one having vital defects of basis or conclusion, and no radical change was possible until, in the eighteenth century, pathological anatomy was cultivated with all the enthusiasm of the early collectors, but with the definite aim of throwing light on medicine. Lancisi and Senac, in the first part of the century, are still quoted by modern writers, but it was Morgagni (1682–1771) who gave the first important impetus to pathology. In his epoch-making work on "The Seats and Causes of Diseases Investigated by Anatomy" (1761–1767)—how significant the title!—the result of inexhaustible energy and keen reflection during half a century—he began the systematic investigation of the differences between normal and morbid conditions, and the relation of diseased organs to clinical phenomena, including diagnosis and prognosis. The visit of John Morgan to the venerable author and the presentation to him, his relative—"affini suo"—as the old man playfully called the Philadelphian, form an interesting link between the origin of modern pathology and the University of Pennsylvania. Morgagni examined not merely rare and curious cases, but especially diseases of common occurrence, and in all his descriptions and conclusions he showed such accuracy and judgment that he not only made pathological anatomy the basis of medicine, but served as a guide and model to all who followed him. By an interesting coincidence, in the same year in which the first volume of Morgagni's work appeared, Leopold Auenbrugger published his book of percussion, opening the way to anatomic diagnosis, but the world was not yet ready for so great a discovery and could not use it for fifty years. Morgagni, however, great as his influence was, was not a pathologist, but a clinician with a firm anatomical basis for his reasoning. The broader field was soon occupied by John Hunter (1728–1793) and Xavier Bichat (1771–1802). Not less indefatigable than the Italian, and with a matchless fertility of mind and precision of observation and experimentation, Hunter included comparative pathology in his search, and so influenced men's minds that ever since his time diseases have been studied as biologists study other natural phenomena. The marvelous insight of Bichat made it clear that the seats of disease were to be sought not merely in organs, but in the tissues that make up the organs, and also that the fluids of the body have an important part in pathology, at least as carriers of disease. During

and soon after the brief but momentous activity of Bichat there was a period that had an effect on pathology not unlike that of the French Revolution on political and social affairs, destroying medical ignorance as the latter swept away feudal abuses. And although medicine, too, had its Bourbons and reactionaries, its course was more steadily forward than that of contemporary politics. It would take too long to describe the course of pathological anatomy after Hunter and Bichat, and the names of Baillie, Bayle, Bretonneau, Corvisart, Laennes, Louis, Bright and Rokitansky are only the greater stars of a large and brilliant galaxy. These men not only put pathology on a firm foundation by showing the anatomic changes in the most important diseases, but they gave clinical medicine a positive basis by demonstrating the relation of the anatomic alterations to the newly discovered signs, often worked out by the same hands that revealed the anatomic changes. They showed how, by the cultivation of the hand, eye and ear, by the microscope and test tube, diagnosis could reach a precision impossible by the use of symptoms alone.

But while pathological anatomy was having this salutary effect on practical medicine, it was also opening up larger vistas in the science of pathology. The creative mind of Johannes Mueller and the unparalleled activity of Virchow caused a productiveness greater than ever before. Mueller forever destroyed the power of dogma in pathology, and in its place put method.

There are certain important aspects of the study and teaching of pathology that may be considered with advantage at such a time and in such a place. "Practical teaching" and "laboratory methods" are the watchwords of the day, but it is sometimes possible to see these methods carried on to the neglect of real learning. Without actual handling, seeing, analyzing, drawing and describing, such a topic as pathology cannot be mastered, but to do it properly requires sound preparation, cultivated habits of thought, patience, the necessary raw material, reagents and apparatus, and sufficient time. And yet time, in our crowded medical courses, is very often lacking, and the student is expected to get along very often without most of the other things. Few can learn to draw, paint or play a musical instrument without a teacher, and usually a certain degree of excellence is required of such teachers, and yet medical students are often expected to master various laboratory branches with few teachers,

and these very often poorly informed and untrained in imparted knowledge. A distinct need in the teaching of pathology is a sufficient number of able teachers. In any natural science, if not in all sciences, it is essential that the teacher should be an investigator. In pathology, the outlook of which changes so rapidly, nothing but participation in the development of knowledge will prevent the rusting of the faculties. This does not mean that every teacher and assistant in a laboratory must be a genius. Technical details and the making of autopsies can be left to dexterous prosecutors who are working to win their spurs; the examination of students' work can be done by any well-informed, critical and conscientious young worker, but the direction of the work should be in the hands of the ablest man available, well trained, original in mind, receptive and sympathetic for every other branch of science.

The elevation of the laboratory has led to a top-heavy way of teaching in some schools, by encouraging students to do advanced original work before their foundation is sure. The advantages of gradual advance from known to unknown are here abandoned, as we can sometimes see when students write articles on the protozoan origin of cancer before they have seen a dozen different examples of cancer or examined a known protozoon.

The insufficient number of teachers in nearly all laboratories may have had something to do with another interesting development of the present time—the demand for research in institutions free from teaching duties, though this has come partly, no doubt, from a laudable desire to more rapidly advance science for itself. The view that research can only be done by hermit-investigators is a pernicious one in many ways. The original investigator, of course, needs time and often seclusion to perfect his work, and there have been and always will be some who can only work in retirement. For this end academies and institutes have in the past offered facilities and may with advantage be assisted in still further doing so. On the other hand, endowments to existing teaching laboratories could often more economically attain all desirable ends. The general statement that research is incompatible with teaching positions, even those entailing considerable expenditure of time, is refuted by the examples of such men as Helmholtz, Ludwig, His and a host of others within the most productive period of science. Not only is the combination possible, but it might be argued with considerable

success that the ultimate gain to knowledge would be greater by keeping the example and methods of great investigators closely before younger minds, for these are things that cannot be transmitted by lectures or books.

The hermit idea has even been applied to plans for hospitals. This also has sources of error—the one, that good work can be done in a hospital in which no research is carried out. The truth is that hospital physicians (and the argument is true of those in private practice) cannot remain efficient if they cease investigating. The other, hardly necessary to mention, because it refutes itself, depends on the fact that a hospital with research as its chief object, and relief of suffering secondary, is inconceivable. If hospitals can only be stimulated to better work by the endowment of institutes for clinical experiment, it might be worth the trial, but the whole course of medicine shows such a trial is unnecessary. The better way would be to furnish hospitals, including asylums of various kinds, with means of research, laboratories, apparatus and trained workers; to have a sufficiently large corps of clinicians to carry on modern methods of investigating and treating the sick, and to choose for such positions only those who are capable of advancing the subject.

The method that has been accepted as the solution of the problem in pathology is to appoint assistants to so-called fellowships, often with unnecessary or unwise restrictions on their time and work, and without proper facilities for either work or instruction. Often the ambitions of such appointees are so far removed from their positions that their own time, as well as that of those who should guide them, is thrown away. Science gains nothing. Thomas Fuller's remark is applicable here, that "many can play Apollo's lyre who are not able to guide his chariot," and the advance of knowledge would often gain more by giving an overworked teacher a servant at ten dollars a week than one or a half-dozen fellows at $500 or $1,000 a year each.

Another obstacle to the growth of pathology, and particularly of pathologic anatomy, is the neglect of or objection to autopsies, a difficulty that affects physicians in all kinds of practice, hospital or private, by depriving them of the most powerful incentive to careful work. This is the one feature that makes the scientific part of medical education in America still inferior to that of Europe, and

one that prevents the keenest critical spirit from developing in the non-operative departments of practical medicine.

The difficulty depends partly on a sentiment that is not new in the history of civilization, and is not associated, as is sometimes thought, with any one creed, race or color. The Roman, who thought it not only diverting but instructive to see the butchery of the arena, would never think of permitting the dissection of a cadaver in order to learn anything useful, and Charles V, who thought little of having men dissected alive, tried to prevent them from dissection when dead. In some countries that we look upon as much below our own in civilization, benevolent people leave money to provide for autopsies on those whose families are unable to pay to have such operations made, while in America, so-called philanthropists busy themselves to prevent the bodies of those who never benefited humanity in life from doing so after death by reaching the dissecting table. In the lavish waste of life and health that occurred in army camps in the Spanish-American war it was no less instructive than depressing to see the neglect of pathologic anatomy. For weeks the question as to whether there was typhoid fever in the camps was met by contradictory assertions. It took months to get microscopes, culture and capable observers to the hospital. Yet a half-dozen autopsies could have settled the problem very quickly. While large sums were spent for instruments to treat wounds that never came, some of the largest hospitals did not possess a single autopsy instrument. It was said by those in high places that people would not like to have the dead soldiers examined; but can we suppose that those who were willing to risk the mutilation of the machete would object to a decent autopsy, or that men who thought it sweet and glorious to die for their country would not be willing to be examined post mortem for the benefit of others?

The difficulty in respect to autopsies does not depend on public sentiment alone, but on a certain neglect on our own part. I think we may hope that as pathology gets everywhere out of cellars and back rooms, and has local habitation such as we see here, its cultivation will assume a broader and more independent character.

THE DEVELOPMENT OF THE MEDICAL LABORATORIES OF THE UNIVERSITY OF PENNSYLVANIA.

By Dr. Horatio C. Wood,
Professor of Therapeutics in the University of Pennsylvania.

In 1832, when the waves of excitement due to enraged Indians and epidemic cholera had subsided about Fort Dearborn on the shores of the Michigan Lake, 150 people represented the future city of Chicago. In 1871, less than half a century later, a great city lay in ashes, but with forces unabated and hope undismayed. It may well be that the man who contended with savages and pestilence saw the growth of the great metropolis and its purification by fire.

It has so happened that my life has seen the growth of the laboratories of the Medical Department of the University of Pennsylvania from their first shadow of existence to their present magnificence, and it has seemed to me that perhaps the first minutes of the half hour allotted to me in the present services could not be better spent than in showing the development of the Now out of the Then.

In all ultrascientific treatises it is essential to begin with the definition of terms. Owing to the fact that in the State of Pennsylvania, to modify, enlarge, or pervert the English language is not a penal offence, the term "laboratory" is often misused in medical catalogues and other aristocratic positions. Webster defines "laboratory" as "a workshop of a chemist; also a place devoted to experiments in any branch of natural science, as a chemical, physical or biological laboratory." Frequently a place where lungs and spinal cords and various other things are cut and studied with the microscope is spoken of as a pathological laboratory. Perhaps by-and-by we shall call a room where potatoes have their eyes examined, their diseased parts excised, and themselves surgically prepared for the resurrection of the springtime, a potato laboratory. In the earlier part, at least, of the present address the term laboratory is used in its original sense, to denote not a room, nor a house, nor anything, but a place—it may be a mansion, it may be four squares of brick pavement—within which experiments are performed.

Somewhere in the early sixties, probably in 1864 or 1865, having a desire to study medicine experimentally, I found that the only man in the city of Philadelphia who could give me practical instruc-

tion was Dr. S. Weir Mitchell, who then had one or two rooms in the famous Chance Street building, the subsequent scene of the labors of Agnew, Keen, and others, and who was then engaged in various experimental investigations on the nervous system. It was not long before he made me a proposition to assist him in his researches and to publish with him the results of our work. This connection would have been formed had it not been for Dr. George B. Wood, who, by the greatness of his renown, the force of his character, the extent of his pecuniary resources, and his lack of direct heirs, dominated at that time the College of Physicians, the Philosophical Society, and the Medical Department of the University, much more his struggling nephew, who, he insisted, by studying botany, should prepare himself for a career in materia medica and therapeutics: and so, having been instructed by Dr. Mitchell how to insert a canula into an artery, I graduated in practical physiology, and took up actively the study of botany and materia medica until three or four years later, when, having mastered the elements of those sciences, it was possible for me to revert to the study of experimental medicine.

For the work to be done a workshop was necessary. The private treasury was so low that the luxury of a room in Chance Street was unthinkable. By this time Dr. George B. Wood had so advanced in age that he wanted the care of his garden, greenhouses and stables lifted from his shoulders, and made me his deputy. Having this authority, with his consent it was possible for me to use, according to the different stages of the weather, the back of the large yard, the stable, or the greenhouses as an experimental laboratory. Fortunately, at that time antisepsis had not been heard of.

Instruments were very few. The old rifleman on the shores of Lake Michigan brought down unerringly the deer or the Indian with a weapon which the modern sportsman or fighter would consider hopeless; and so the results of work in this primitive laboratory were accurate and permanent, although my young physiological hearers will smile at the statement that, with the aid of tin- and other smiths, we made our own instruments. Our hæmadynomometers, for instance, were obtained by boring a hole in the iron flasks in which mercury is ordinarily stored, inserting a U-shaped glass tube, fastening on a home-made scale, and then measuring blood-pressure by the eye. Under such circumstances was finished the first complete

investigation of a human disease ever made on animals, namely, that on "Sunstroke, or Thermic Fever," published in 1870, a research which was so complete and final that of it Professor Osler wrote in 1895: "Very little has been added to our knowledge of sunstrokes since its completion." Some of the papers which emanated from this impromptu laboratory have had their results challenged, but a reinvestigation of the subject has in all cases confirmed the original conclusions, so that the accuracy of the out-door-greenhouse-stable work has been established by time.

In 1870 the Medical Department of the University moved from Ninth Street to its present location; but, although one or two rooms were assigned to the professor of physiology, no experimental work seems to have been done in them, so that for some years longer the institution was still dependent upon the bountifulness of Dr. George B. Wood for the continuation of its laboratory activity.

It is a rather remarkable fact, though probably in accordance with the ordinary laws of progress, that in passing from the old to the new régime at the University, there were appointed demonstrators who were experimentalists and who from time to time made various researches, although the professor to whom they were subordinate was in no proper sense a practical physiologist. The first demonstràtor of physiology was Dr. Henry C. Chapman, appointed in 1876; he was followed in the fall of 1877 by Dr. B. F. Lautenbach, who in turn was succeeded in 1878 by Dr. Robert Meade Smith.

In 1876 I was elected to the chair of therapeutics, being the first professor suffering from the itch for experimentation who had ever been injected into the Medical Department of the University, chemists excepted. All the rooms which might possibly have been used for a pharmacological laboratory were fully occupied; the plans of the building had, however, fortunately been chiefly overlooked by Professor Rogers, who had reserved the lion's share for himself, and after some discussion it was decided that some of Professor Rogers' rooms should be occupied by the janitor, and the apartment which had been allotted to that worthy should be given to me. No allowance was made by the University for the furnishing of these rooms or for the purchase of furniture or of apparatus. I remember with what glee I bought for five dollars at the auction of the débris of the great Centennial celebration, in 1876, a very large heavy table which had been made for the purpose of the draughts-

man, but whose fate was to become the centerpiece of a physiological laboratory.

The Smithsonian Institute granted me $1,000 to assist in a research on fever, to which out of my own funds another $1,000 was added, and so the necessary apparatus was invented and manufactured, and all went as merry as the marriage bell. But, mark you, of necessity the laboratory contained no apparatus except that which was bought for some special investigation. Much horror was caused by a letter received from a distinguished foreign physiologist, who wrote directly after the publication of the work on fever, that "since you are making such large researches in America I have intended to go and see your laboratories," and the relief was great when at the end of the letter were found the words, "but I find that circumstances will prevent my visiting you."

It is, perhaps, worthy of record, as told me by Professor Reichert in 1886, that when he entered upon his duties he found in the laboratories no apparatus which was not my personal property; so that the first piece of physiological apparatus which ever belonged to the University was a Ludwig's kymographion, presented by Dr. S. Weir Mitchell shortly after Professor Reichert's election, an apparatus which, like its donor, was so well constructed that up to the present day it continues in its career of usefulness with its forces seemingly unabated.

During recent years the development of the Experimental Laboratory of the Medical Department of the University has been rapidly progressive. The election of Dr. Simon Flexner to the Chair of Pathology in 1899 led to rapid growth in the work on experimental pathology, and in 1895 a new impetus was given to experimental researches by the creation and endowment of the Pepper Clinical Laboratory, an institution that has already made itself an enviable reputation in the recent annals of experimental science.

That much work has been achieved in these laboratories is shown by the fact that, independently of the Pepper laboratory, there have been published from them 250 experimental papers embracing a very wide range of physiological, pharmacological and pathological subjects.

Hitherto we have been speaking of the experimental laboratory, but the term "laboratory" is also now used as the name of the workshop in which students are taught the practical details of

the underlying medical sciences, and the building in which we now are has been erected chiefly to meet in the University the needs of the new method of instruction. There is in some quarters a tendency to question the value of this laboratory teaching. Without practical study, however, the student never can apprehend the foundation principles and methods of the sciences, so that if physiology and pathology are to the medical student worth studying at all, they are worth studying by the only method that can bring real knowledge and apprehension. Moreover, day by day in the ordinary practice of medicine the use of instruments of precision becomes more and more important, and, perhaps, as beneficial a result as is achieved by the laboratory is the acquiring by the student of the power of using delicate scientific apparatus and of correctly observing and recording the results reached. If nothing further were reached than to teach the student the proper use of his especial senses, much would be gained. To be able to hear, to see, to apprehend—that is knowledge above price to the naturally purblind and purdeaf children of men.

The growth of science, the multiplication of instruments, the refinement of technique, make the well-equipped laboratory to-day essential, but to the end the Man will survive as the dominant factor. I remember years ago in Philadelphia a group of physicians who were marvelously acquainted with the microscope, who spent their time in testing lenses, working with polariscopes, and studying eyepieces and adjustments; vain labor was it, yielding but barren fruitage. Of such as these Professor Leidy said to me one day: "It is not the object glass but that which is above the eye-piece that brings the result." Leidy knew comparatively little about the construction of the microscope, but using it, not as an object of study, but as an instrument, his master mind laid much of the foundation of our present knowledge of the lower forms of animal life.

If, now, these great laboratories are to be used in a manner worthy of their possibilities, it is essential that they be employed as instruments, and that the men should be found who shall use them, not only for the purposes of teaching, but also for the purposes of advancing the boundaries of medical science.

The man having been found, it is essential that he be properly handled, if you will pardon the borrowing of an athletic term. Formerly our professors of physiology and pathology were medical

practitioners; but what has been gained so far as the higher uses of the man are concerned, if he has been relieved from the burden of medical practice to be crushed under the burden of excessive teaching? This is the peril of the hour so far as medical science is concerned. May I quote from the published report of a sister institution, which we all delight to honor? From 1896 to 1900 the professor in charge published thirteen original papers, all, I believe, entirely his own work, and as valuable as pure water flowing from a mountain spring. In the fall of 1900 a new and much expanded physiological course went into effect; in the three years subsequent to this the professor published one paper, with the assistance of a co-worker, probably a student. Why? Evidently because one back already loaded with a crate of earthenware cannot carry also a pack of dry goods, even though these goods be silken fabrics of deftest weaving, brilliant with the sunshine or dreamy with the mystery of the far-off Orient.

It cannot be gainsaid that the requirements of increasing knowledge and the improved methods of modern teaching make instruction far more laborious than it used to be. How, then, is this recent danger to be averted? Simply by increasing the personnel of the teaching staff. This means increase of expenses, so that a laboratory like the present increses the expenses of the medical school not only by the three or four thousand dollars a year which is required simply to keep it clean, warm and light, but also by requiring an increase of its staff of officers, unless its great opportunities are to be wasted. On the other hand, medical classes are being reduced by the higher standard of education required, by the multiplication of medical teaching institutes, and probably in the near future by the lessening of the demands for the profession through the improvements of sanitation.

With greater need for money there is less income from students. Endowments are becoming as essential for medical departments as for other technical schools, and the institution which fails to get such endowments must in the long run be left behind. Better to have small laboratories with large endowments than large laboratories with small endowments. Fortunate it is for the Medical Department of the University of Pennsylvania that in the character and record of its provost it has a guarantee that that which has been created shall not fail of use.

But, Fellow Alumni of the University of Pennsylvania and all persons who are interested in the growth of this our Alma Mater not only as a centre of medical teaching, but also of medical thought and progress, we have no right to expect that one man or a few men shall obtain the pecuniary foundations upon which medical advancement must rest. It is an extraordinary fact that so far the technical schools in America which have received the least support are those connected with a profession which comes into the closest contact with the lives of the whole people. Are doctors afraid to talk freely of the needs of medical laboratories and of medical schools for pecuniary assistance? Is there a lack of enthusiasm among us? Or is it that morbid dread of financial discussion which led Dr. George B. Wood, as I have often heard him say, always to take the other side of the street when he saw a man approaching to whom he had sent a bill for services rendered? I know not; but certainly we are somehow at fault in not making plain, not *our* needs, but for the people's needs—for better education of doctors who shall serve them, and urgent hurry in the growth of that science which each day lifts more and more of the physical ills that burden the race.

The profession, however, has not been so recusant as at first sight appears in this matter. To the modern school of medicine the hospital is a necessity, and in the foundation of hospitals the medical profession has not been idle.

Sometime in the latter part of the sixties Professor Stillé was delivering in the Academy of Music one of those old-time commencement addresses in which the central waxen lay-figure of platitudes was clothed in the finest garments of pure and fashionable English. While semi-dozing in a carefully selected dark corner the thought came to me "we must have a hospital when we move the Medical Department over the river." The late Dr. William F. Norris, known to us at that time as "Bill Norris," sat next to me. I nudged him and gave him the benefit of my thought. He said, "Let us talk it over after the ceremonies with Pepper," whom we were already selecting as the natural leader of our party. This was done, and we finally, notwithstanding the almost contemptuous disregard of our elders, obtained permission from the Board of Trustees to make the attempt. Dr. George B. Wood gave us a subscription of $10,000. Mr. Henry C. Lea agreed to pay, and subsequently did pay, the last $2,500 on every $100,000 up to

$500,000, and we went to work. For the ground upon which to build the hospital we applied, with final success, to the city, and then we essayed the Legislature for assistance with the building. I believe at that time no money had ever been given by the State to a hospital not under State control, but during a whole winter we met once or twice a week, usually at 10 P.M., districted the State of Pennsylvania, searched out in each district the medical alumni of the University, made out as far as possible who were the medical attendants of each Legislator, and then by personal letters applied to our professional brethren, almost always with quick and sure response, and so we obtained our appropriation. At last the lot, the building, and the first endowment were obtained, and to the medical profession the University Hospital owes its existence and the possibility of its ever-expanding life.

The University Hospital spends at least $75,000 a year above all moneys which it obtains from pay patients. This sum is in verity a payment for the clinical material which under our present medical curriculum is essential for the teaching during the third and fourth years of the course. If to this money be added the interest of three-quarters of a million of dollars, an under-valuation of the plant of the University Hospital, and our annual medical class of students be estimated at 125, the cost of clinical material for each individual student is for each of the last two years of his course about $500. It is in providing for this expenditure that the medical profession has done its work. Assuredly, however, the time has come when, at least temporarily, the medical profession should change the direction of its efforts. The deep undermoan of human suffering fills the world always with the sound of its pleadings, and when a hospital has reached the wealth of popularity and achievement that has come to the University Hospital its never-silenced cry for greater powers for service will always find altruistic ears to listen. For of such is the ever-multiplying harvest from the work of the great Galilean Master, at once the result and the seal of His divine teachings. The duty of the medical profession at the present moment is to make the world understand that as the laboratory underlies medical teaching so does it underlie the art as well as the science of medicine; and that to endow hospitals and to forget laboratories is to prune and train the upper branches of that tree of knowledge which is for the healing of the people, and to forget to keep alive the root which is the source of all-continuing development and growth.

THE AMERICAN MEDICAL ASSOCIATION.

The fifty-fifth annual meeting of the American Medical Association, held at Atlantic City, N. J., June 7 to 10, 1904, will long be remembered as one of the most successful in the history of that Association. From the point of view of the pharmacist this meeting was of more than ordinary interest on account of the inauguration of the innovation provided for at the meeting in New Orleans last year, admitting pharmaceutical members to the Section on Materia Medica, Pharmacy and Therapeutics.

While it is true that the number of these members admitted at this meeting was limited, the necessary precedent has been established, and it may reasonably be expected that with the added safe. guards, provided for by the section, at future annual meetings the number of pharmaceutical members will be materially increased.

The working by-law, relating to pharmaceutical members, adopted at this meeting, provides that any pharmacist desiring to join the Section on Materia Medica, Pharmacy and Therapeutics of the American Medical Association must secure the endorsement of the local County Medical Society at least three months before the date of the annual meeting of the American Medical Association.

This endorsement with the necessary application is then to be forwarded to the Executive Committee of the Section on Materia Medica, Pharmacy and Therapeutics, who in turn will present the name to the members of the section for election.

This by-law places the responsibility for efficiency and probity of each individual member with the local society, and it is hoped that in this way it will be possible to prevent the admission of individuals who would be likely to use any possible advantage that membership in the American Medical Association would give them for commercial purposes.

For the pharmacists who were present as members, guests or delegates the meetings of the Section on Materia Medica, Pharmacy and Therapeutics were, of course, of greatest interest. Under the very able chairman, Dr. O. T. Osborne, Professor of Materia Medica and Therapeutics at the Yale Medical School, this section was able to present a programme containing no less than thirty-three papers.

The initial meeting, Tuesday, June 7th, consisted practically of a symposium on the abuses arising from the use of secret nostrums

and proprietary medicines. All of the communications, with the possible exception of the one on the coming edition of the United States Pharmacopœia, by Prof. Joseph P. Remington, were largely devoted to this particular problem.

The chairman, Dr. Osborne, in his address pointed out some of the possible dangers, to public health and morals, of the rapidly increasing nostrums and irregular practitioners.

The chairman's address was followed by the reading of the report of the committee on proprietary medicines. This report, in the absence of the chairman of the committee, Dr. Harry H. Moody, was read by the secretary, Dr. C. S. N. Hallberg, and was a conservative and a highly important communication. The committee point out that the indiscriminate condemnation of all proprietary preparations is not alone unjust but also tends to defeat or, at least, delay any necessary improvement or reform. They recommend that the American Medical Association have in view the gradual elimination of objectionable advertisements of medicinal preparations from the advertising pages of medical journals, particularly the *Journal of the American Medical Association*. With this object in view, the committee enumerate some of the most objectionable features of these preparations, and suggest changes that would be necessary to bring others within the limits of strictly legitimate preparations.

The plan as outlined would appear to be reasonable, and if carefully put into operation would be of incalculable benefit to the practice of medicine as well as pharmacy.

"Federal Supervision of Drugs" was the title of a very interesting communication by Dr. Harvey W. Wiley, the Chief Chemist of the Bureau of Chemistry, Department of Agriculture, in which he described the work that is being done at the present time by the Department of Agriculture as well as by the inspectors of the Department of the Treasury to prevent the importation and sale of adulterated drugs and food products. He also referred to the efforts that are being made by the Postmaster General to prevent the transmission in the mails of fraudulent and obnoxious preparations or advertisements. Dr. Wiley thinks that if the Postmaster General receives the hearty support of the members of the medical profession in his campaign against concerns doing a fraudulent business the latter would soon be exterminated, as they cannot flourish or

even exist without the wide publicity that is secured to them by the free use of the mails.

"The Eighth Decennial Revision of the Pharmacopœia of the U. S. A." was the subject of a paper presented by the chairman of the Revision Committee, Prof. Joseph P. Remington, who said that the new Pharmacopœia would probably appear in October. He spoke at some length of some of the advantages that are expected to accrue from the adoption of the recommendations of the International Conference for the unification of the formulæ of potent medicaments, and called attention to the fact that after the adoption of the new Pharmacopœia a number of the tinctures of potent drugs will be materially reduced in strength.

Tincture of aconite, for instance, instead of being 35 per cent. strength, will, with all of the other potent tinctures, have the uniform strength of 10 per cent.

The use of synonyms will be discouraged by placing them in the index but not in the body of the book. Average doses will be given. A number of the more widely used synthetic chemicals will be admitted under descriptive or definite chemical names.

"The Relation of the Physician to Proprietary Remedies" was the title of a paper presented by Dr. William J. Robinson, of New York. In this paper the writer divides physicians into three groups. The members of the first, or group A, prescribe anything that comes to their knowledge, while the members of grcup B are ultra-conservative, and never use proprietary medicines under any conditions. The members of class C, on the other hand, will carefully inquire into the character of new drugs and preparations and, if satisfactory, give them a fair trial.

Robinson differentiates between nostrums of secret composition and new remedies for which a patent has been granted, or is obtainable, and believes that the use of the latter is perfectly justifiable.

The discussion on these papers, collectively, was quite general, and certainly spirited. The general trend of the discussion, however, appeared to be that the practical instructions in materia medica and pharmacy as given in by far the greater number of medical colleges was inefficient, and that this lack of training, combined with the prominence given the claims of proprietary medicines in the advertising pages of medical journals, was largely responsible for the widespread use of this class of medicinal preparations.

The remaining papers were, with some notable exceptions, largely devoted to questions of therapeutics. One of the more interesting of the exceptional papers was on *Apocynum Cannabinum.* This was an analytical study of the physiological action of preparations of this drug, by Horatio C. Wood, Jr.

Dr. Wood finds apocynum to have a stimulating influence on the circulation, acting very much as does digitalis. It causes a slowing of the pulse, a rise of blood pressure and, like digitalis, arrests the frog heart in systole.

To give a full account of the scientific meetings would be practically impossible, as the programme alone consisted of a very respectable volume of more than 140 pages. The twelve sections into which the Association is divided, together with the general meetings, had offered to them upwards of 400 scientific communications. The papers presented at the several section meetings were not alone numerous but were also much above the average in quality of contents. The most encouraging feature, however, of the scientific meetings was the marked interest that was displayed by the members attending them. This interest evidenced the earnestness and sincerity of the members to improve themselves by absorbing such information as was offered them, and also to contribute in return any experiences and ideas that in their opinion might, or would, be of interest and value to their fellow practitioners.

The total attendance was the largest in the history of the Association, the (2,890) registration exceeding the highest previous attendance by fully 40 per cent.

No little of the credit for the success of this meeting is due to the local Committee of Arrangements, who were responsible not alone for the selection of the various meeting-places, but who also arranged and successfully carried out a most elaborate programme of social events, and in this way occupied every moment of time from the arrival of the members on Tuesday to their leaving, on the special train, on Friday afternoon to attend the dedication of the new Medical Laboratories at the University of Pennsylvania in Philadelphia.

The newly elected president of the American Medical Association is Dr. Lewis S. McMurtry, of Louisville, Ky., and the next meeting will be held in Portland, Ore., in connection with the Lewis & Clark Exhibition to be held there next year.

The officers of the Section on Materia Medica, Pharmacy and Therapeutics for 1904–1905 are: Heinrich Stern, New York, chairman; William J. Robinson, New York, vice-chairman; C. S. N. Hallberg, Chicago, secretary; J. W. Foss, Phenix, Ariz., delegate.

M. I. W.

OBITUARIES.

William Henry Webb, M.D., was born on the 16th day of January, 1835, in Philadelphia, where he spent all his early life. At the commencement of the Civil War he was in the drug business with his cousin, Mr. John E. Grove, on Vine Street, below Thirteenth, and belonged to a company of Home Guards called "The Keystone Artillery." Early in 1862 he went to Washington, where he received an appointment as Chief Druggist at the Armory Square Hospital. Here he made the acquaintance of and became very intimate with the celebrated surgeon, Dr. Bliss, who was then in charge of the hospital. He was located here for some time, ranking as Hospital Steward, but on the completion of the Government Laboratory in Philadelphia, he was transferred to it by the department as an assistant to Chief Chemist Maisch.

In 1866, he took his degree from the Jefferson Medical College; his thesis on typhoid fever being considered very remarkable on account of its containing some original discoveries made by him relating to the disease. After graduation he had a quizz class at the college and was an assistant in clinic to Dr. DaCosta and others, among whom was the celebrated surgeon, Dr. Gross.

He also graduated from the Army and Navy College and the College of Pharmacy in 1868, becoming a member of the latter in the same year. Dr. Webb was also a member of the College of Physicians and of Post 2, Grand Army of the Republic, of which he was surgeon for twenty-three years. For some years he was medical examiner for the New England Mutual Life Insurance Company and the John Hancock Life Insurance Company. He belonged to Franklin Lodge, No. 134, F. and A. M.; Corinthian Chasseur Commandery, No. 53, Knights Templar, and the Lulu Temple, Ancient Arabic Order of the Nobles of the Mystic Shrine.

He was in practice in the northern section of the city since 1868, and at No. 556 North Sixteenth Street since 1880. He died December 20, 1903.

C. A. Weidemann.

FRANK LUERSSEN.—Mr. Luerssen was born in Philadelphia on March 22, 1861, and spent practically all of his life there until he graduated from the Philadelphia College of Pharmacy.

During his lifetime he had managed pharmacies in New York and Washington. At one time he was in charge of Llewellyn's pharmacy, at Broad and Chestnut Streets, Philadelphia.

On April 19, 1893, he was married to Mrs. Aurelia Schaeffer, of Salem, New Jersey, and shortly thereafter established a pharmacy in the city of Salem, which he carried on with success until about one year prior to his death, when failing health made it necessary for him to retire from active business. He died on January 6, 1904.

Mr. J. W. Acton, Esq., of Salem, adds: "In submitting this brief outline of Mr. Luerssen's career, I feel an impulse to add that he was much esteemed here for his gentleness and kindness of heart, and his unostentatious generosity. He had great pride in his profession and exhibited great zeal in his efforts to establish here a pharmacy that would be more than a 'country drug store,' and compare favorably with those of larger cities. He was public-spirited and took an earnest interest in the permanent betterment of our little city. At all times he stood for improvement and municipal progress." C. A. W.

WILLIAM M. CANBY.—By the death of William M. Canby lovers of botany have lost a comrade, and the world has been deprived of the presence of one of nature's noblemen—a man who was almost unceasing in his efforts to give to others a part of what he had learned, and who, endowed as he was with the gift of genius, largely enriched our knowledge of plant life.

To those not familiar with botanical work Mr. Canby's abilities in this field of study were little known, his innate modesty preventing him from accepting degrees from colleges, who would have been only too glad to bestow honor upon him.

In his home city, Wilmington, Del., it may safely be said that many did not know there lived among them a man to whom they were indebted for their beautiful parks—a man who kept in touch with and was so much loved and appreciated by the leading botanists of the world.

His love for botany began early in life, and, being an enthusiastic collector, he in 1858 began a systematic collection which, augmented by exchanges and purchases, resulted, some forty years later, in an

herbarium of more than 30,000 specimens, purchased by and now in the possession of the New York College of Pharmacy. A second collection, some 15,000 specimens, he presented to the Natural History Society of Wilmington, Del., who naturally treasure it in memory of one of the most genial and beloved of men.

To have known William M. Canby was to love him. He was always ready to impart his knowledge of botany and give advice even in matters of business, to which he was no stranger, having been identified with the Baltimore and Ohio Railroad as a director; a director in several banking concerns, and for twenty-four years President of the Wilmington Saving Fund—the strongest institution of its kind in the State of Delaware.

There is now a movement on foot to erect a substantial memorial of him, which will be placed in the beautiful Brandywine Park, that he so much loved and to which he devoted a great part of his energy and ability in beautifying.

The following has been issued by the Canby Memorial Fund Committee:

Many of the friends of the late William M. Canby, in recognition of the eminent service he rendered to the scientific world as a botanist, and to the city of Wilmington as President of the Park Commission, have thought it fitting and appropriate to erect a simple, plain, but suitable memorial to him in the Brandywine Park.

The Park Commission having given its consent to such a memorial, also added its approval by appointing a committee consisting of W. D. Bush, John M. Rogers and J. Newlin Gawthorp, who, with the Hon. William C. Spruance, Justice of the Supreme Court of Delaware; Prof. C. S. Sargent, of Harvard University, and the Rev. W. F. D. Lewis, minister of the Rodney Street Church, have decided upon a suitable site for such a memorial.

The site selected lies on a cliff overlooking the third dam on the park driveway between Franklin and Broome Streets.

The nature of the memorial will not be decided upon until all those who knew and appreciated the work of the late William M. Canby have had the opportunity of contributing.

Contributious may be sent to the Rev. W. F. D. Lewis, 1314 West Tenth Street, Wilmington, Del., who will act as treasurer of the fund, which will be placed in bank until the sum necessary for such an appropriate memorial is raised. J. S. Beetem.

NOTES AND NEWS.

A BRONZE STATUE OF DR. BENJAMIN RUSH was unveiled in Washington on June 11th. It was given to the nation by the American Medical Association, and Prof. J. H. Musser, of Philadelphia, President of the Association, made the presentation address. It was accepted on behalf of the Government by President Roosevelt. The statue is of heroic size and stands on the grounds of the U. S. Naval Museum.

College House of the Philadelphia College of Pharmacy.

COLLEGE HOUSE OF THE PHILADELPHIA COLLEGE OF PHARMACY.—In the November issue of this JOURNAL attention was called to the establishment of a house for the use of the students of this College. Results have shown that this undertaking was a wise one, not only in furnishing the students with comfortable and healthful surroundings, but also in promoting fraternal relations among them.

This year the College House Association has, by the aid of Mr. William Weightman, of the firm of Powers & Weightman, secured control of a finely

equipped apartment house, fitted with all modern conveniences, bathrooms, steam heaters, parlor, reception-room, toilet-rooms, dining-rooms, and accommodations for sixty students.

The house is situated at 112 North Eighteenth Street, and is everything that can be desired, with an open outlook in the rear. Plenty of ventilation is provided. A nominal board is charged each student, which is less than poor accommodations elsewhere would cost.

Present and prospective students should communicate at once with E. Fullerton Cook, P.D., 145 N. Tenth Street, Philadelphia. The house is under the control of a Board of Governors, which is composed as follows: Mahlon N. Kline, Chairman; Prof. Joseph P. Remington, Howard B. French, W. A. Rumsey, Prof. S. P. Sadtler, Henry C. Blair, Jacob Baer, James T. Shinn and E. Fullerton Cook.

HOWARD B. FRENCH, President of the Philadelphia College of Pharmacy, gave an informal dinner to the Faculty and members of the Board of Trustees, at his summer residence, "Alderbrook," near Valley Forge, on Wednesday, June 22d. The ride from the station to Mr. French's home is through a beautiful section of country, which is especially attractive at this season, with the roses in full bloom and ripe cherries loading the trees. Mr. French's grounds are extensive, including a large lawn and a wooded area, both of which are in excellent condition. The occasion furnished ar opportunity for the members to meet together socially, and was highly enjoyed by all.

PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.—The annual meeting was held at Cambridge Springs, Crawford County, June 21st, 22d and 23d, the Hotel Rider being the headquarters of the Association. A full account of the meeting will be published in our next issue.

MILK IN TYPHOID FEVER is the title of an illustrated pamphlet recently published by the Smith, Kline & French Company. The color illustrations, showing the actual condition of the intestinal surfaces during the different stages of typhoid fever, are well reproduced, and are from Kast and Rumpel's classical work. The paper is devoted to a discussion of the use of cereal decoctions in modifying the defects of a milk diet alone in typhoid fever.

COMMERCIAL CATALOGUES.—In a plea for a bibliography of the documents pertaining to American pharmaceutical history Edward Kremers (*Bulletin of Pharmacy*, June, 1904) says: "In such a bibliography catalogues of manufacturers and jobbers will and should occupy a conspicuous place. Each existing manufacturing and jobbing firm should regard it a matter of pride to collect a complete set of its own catalogues, price-lists, and even leaflets, if possible, and present them to the American Pharmaceutical Association. The sooner this is done the better."

AMERICA'S FIRST CUTTER.—M. I. Wilbert (*Ibid.*) gives a sketch of T. W. Dyott, who, during the early part of the nineteenth century, conducted what was probably the first cut-rate drug store in this country, his establishment being at Second and Race Streets, in Philadelphia.

MASSACHUSETTS COLLEGE OF PHARMACY.—Prof. Wilbur L. Scoville has resigned the professorship of pharmacy in this institution, and has accepted a position with a large Boston drug firm. Prof. E. H. La Pierre has been chosen his successor.

DR. BENJAMIN RUSH

(1745–1813).

From "The History of Medicine in the United States," by Francis R. Packard, M.D.

THE AMERICAN JOURNAL OF PHARMACY

AUGUST, 1904.

SOME EARLY TEACHERS OF CHEMISTRY IN AMERICA.

By M. I. Wilbert,

Apothecary at the German Hospital, Philadelphia.

The science of chemistry, as we know it, may be said to have had its inception in the work of Johann Joachim Becher, who published several books relating to chemistry some time after the middle of the seventeenth century. Becher's ideas, however, were so radically different from those held by the then dominating sect of iatro-chemists that it was not until several decades later that they were finally adopted, in a modified form, by Georg Ernst Stahl as the basis of his theory of phlogiston. According to this theory it was supposed that a substance, which Stahl called phlogiston, formed a part of all combustible bodies and that its separation constituted fire.

This theory, although soon found to be untenable, contributed very largely to the rapid development of chemical philosophy that took place in the latter decades of the eighteenth century, when chemists and philosophers, who were divided into two sects or schools, followers of Stahl or Lavoisier, vied with each other to prove the correctness of their particular beliefs or theories by actual demonstrations and experiments. As is now generally recognized, it is to this experimental work, that was largely done to defend or to prove the correctness of an erroneous theory, that we are indebted for much of our present knowledge of chemical properties and phenomena.

Recognizing the, at that time, crude and undeveloped condition of chemical philosophy, it will not surprise us to find that the first

attempts at teaching the rudiments of this science, in this country, were humble indeed, and that the number of the earlier teachers or students, who were in a position to contribute in any way to the advancement of correct theories or facts, was indeed limited.

In reviewing the accomplishments and achievements of these pioneers in natural philosophy and chemistry, we must bear in mind, therefore, the peculiar conditions of their environment and the incomplete and undeveloped state of the science or art. We should not judge of their achievements by what they themselves have accomplished as practical chemists, but rather by the influence they have had, in a more general way, on their students, their times and their surroundings. In the following pages an attempt has been made to review the names of some of these earlier teachers, as near as possible chronologically, and to point out or to suggest the lines along which they have made themselves worthy of emulation or deserving of kindly remembrance on our part.

Probably the first regularly appointed teacher of natural philosophy in this country was John Winthrop, a descendant of Governor Winthrop, who was appointed professor of natural philosophy in the University of Cambridge, now better known as Harvard, in 1738.

John Winthrop, who died in 1779, was born in 1714. He was a graduate of Harvard and occupied the Hollis chair of natural philosophy in that institution for upward of forty years. The influence that John Winthrop had on the development of the physical and chemical sciences, indirectly at least, has been of considerable moment. It was largely due to the teaching and precept of John Winthrop that Benjamin Thompson, better known as Count Rumford, was induced to pursue his studies into the phenomena of light and heat that have contributed so much to advance scientific investigations along these lines.

In addition to this, Count Rumford, despite the fact that he had been practically expatriated and had spent the greater period of his life in England and in Germany, devised to Harvard University a considerable sum with which to endow a professorship "to teach by regular courses of academical and public lectures, accompanied by proper experiments, the utility of the physical and mathematical sciences for the improvement of the useful arts and for the extension of the industry, happiness and well-being of society."

Among other then existing schools that followed the example

of Harvard, the most conspicuous for progressiveness was the Academy, later known as the College, of Philadelphia, founded by Benjamin Franklin in 1749. The Board of Trustees of this institution, in 1754, elected Mr. William Smith, "a gentleman lately arrived from London," to teach logic, rhetoric, ethics and natural philosophy.

In the latter department he was assisted, after 1758, by the Rev. Dr. John Ewing, who, in that year, was elected professor of natural and experimental philosophy.

The institution of medical schools necessitated a fuller and more exhaustive exposition of what was then known of medical chemistry. Dr. John Morgan, the founder of the first medical school in America, was also the first to teach this special branch of chemistry, or, as he defines it, in his "Discourse on the Introduction of Medical Schools," "pharmaceutic chemistry, that branch of philosophic chemistry which regards the particular properties of such bodies as are appropriated to medicine."

Dr. Morgan was succeeded in the chair of chemistry by Dr. Benjamin Rush, who, at the suggestion of John Morgan, had paid special attention to the study of chemistry while abroad.

Dr. Rush was elected professor of chemistry in the College of Philadelphia in 1769. While it cannot be said that Rush was the first to teach chemistry in this country, he was probably the first to teach it in the more practical or demonstrative way that was being followed in the larger institutions of Europe. On his return from England he had brought with him "a compleat chymical apparatus," the gift of the proprietor, Thomas Penn. One of the special qualifications that fitted him to teach this branch in the newly established medical school was that he had seen every important chemical experiment carried out at least twice, and felt assured that he could duplicate them on his return.

Dr. Rush continued as professor of chemistry until after the breaking out of the Revolutionary War, when the courses of lectures in the medical department of the College of Philadelphia were, for the time being, discontinued.

In 1768, the year before the appointment of Dr. Rush as professor of chemistry in Philadelphia, Dr. James Smith was appointed professor of chemistry and materia medica in the medical school of Kings County, New York. Dr. Smith had studied at Leyden, and

was probably well grounded in the science as it was then known. He did not continue long as a teacher, as owing to his removal from New York, in 1770, he was succeeded in the chair of chemistry by Dr. Samuel Bard, the founder of the medical school in Kings College, who was also the professor of the theory and practice of physic. This school, like the one in Philadelphia, was discontinued during the Revolutionary war. In 1792 it was reorganized as the medical department of Columbia College, and Dr. Nicholl was elected professor of chemistry.

Fortunes of war and Pennsylvania politicians had, in the meantime, played sad havoc with the College of Philadelphia. The legislature of the State had, in November, 1779, passed an act abrogating the charter of the College, confiscating its estates and removing from office all officials, professors and others, in any way connected with the institution. In extenuation of this summary action on the part of the legislature, it may be said that the provost of the college, Dr. William Smith, was suspected of being in favor of the royalist party, and that a number of the members of the board of trustees were thought to be antagonistic to the new government.

The confiscated estates were transferred to a new institution, created by the legislature for that purpose, called the University of the State of Pennsylvania. Dr. John Ewing, who, it will be remembered, had been the assistant of Dr. William Smith in the College of Philadelphia, was elected provost and professor of natural philosophy, in which capacity he taught chemistry until his death in 1802. Considerable difficulty was experienced in trying to organize a medical faculty, and it was not until 1783 that the school was finally put in operation with practically the same faculty that had taught in the College of Philadelphia. Dr. Rush continued to teach chemistry until 1789, when he, with the other professors, resigned to accept the corresponding professorship in the then reorganized College of Philadelphia. In this capacity he was succeeded, on the death of John Morgan and his own advancement to the chair of the theory and practice of medicine, in 1789, by Caspar Wistar, who was elected professor of chemistry and of the institutes of physic. The officials of the University of the State of Pennsylvania decided to continue a medical department of their own, and Dr. James Hutchinson was elected professor of chemistry and materia medica. The career of Dr. Hutchinson is one of the most interest-

ing and most inspiring of the early medical practitioners of America. He was a graduate of the medical department of the College of Philadelphia, and has the distinction of being the first on this continent to win a prize for proficiency in chemistry. This prize, a gold medal, was awarded him in 1774 by the board of trustees of the College of Philadelphia for his superior knowledge in chemistry.

In 1773, after a competitive examination, James Hutchinson was selected to act as apothecary to the Pennsylvania Hospital. In this capacity he served until some time after his graduation from the College of Philadelphia, when he resigned, intending to go abroad to complete his medical education.

The breaking out of the Revolutionary War hastened his return. He sailed from France, in 1777, bearing important despatches from Benjamin Franklin to the Colonial Congress. When near the American coast the vessel he was in was chased by a British man-of-war. Dr. Hutchinson, being desirous of saving the despatches entrusted to him, succeeded in landing in an open boat. The ship itself was subsequently captured and with it Dr. Hutchinson lost not only his personal effects, but also a valuable medical library that he had gathered together while abroad. In 1779 Dr. Hutchinson was appointed by the Legislature to serve as a member of the Board of Trustees of the University of the State of Pennsylvania; he, however, persistently refused to accept any of the medical professorships until after the reorganization of the College of Philadelphia, when, as noted above, he accepted the chair of chemistry in the University Medical School. After the amalgamation of the two Philadelphia schools as the medical departments of the University of Pennsylvania, Dr. Hutchinson was elected to continue as professor of chemistry. Dr. Hutchinson died in the autumn of 1793 of epidemic yellow fever—a martyr to medical science and his own sense of duty to the poor of the city, in the terrible epidemic that ravaged Philadelphia in that year.

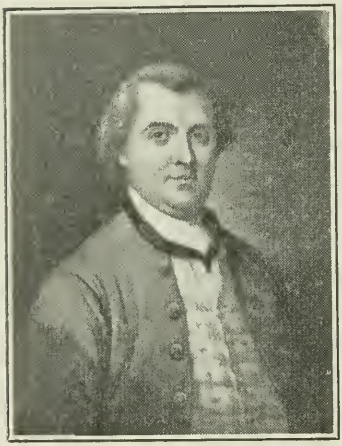
The chair of chemistry in the University of Pennsylvania, vacated by the death of Dr. Hutchinson, was conferred on Dr. John Carson, of whose chemical abilities very little is known, and who died before he entered on his duties as a professor.

Largely if not entirely through the influence of Dr. Rush, the position was then offered to the Rev. Dr. Joseph Priestley, who had but recently arrived in America. After having some correspondence

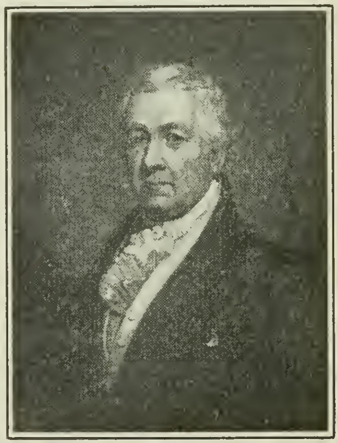
on the matter with Dr. Rush, Priestley declined the offer, preferring to end his remaining days quietly in his retreat on the shores of the Susquehanna.

The arrival of Priestley in America marks a new era in the history of the development of chemistry and chemical teaching in this country. Priestley, despite the fact that he had, at that time, made numerous original discoveries, and among other substances had discovered oxygen, was a staunch adherent of the theory of phlogiston, and despite his age he entered actively into the controversy that was then waging between the followers of the two schools.

Opposing him in this country were three men that deserve more



DR. JAMES HUTCHINSON (1752–1793).



DR SAMUEL LATHAM MITCHILL (1764–1831).

than passing mention. The first of these, and the first to teach the principles of the Lavoisierian or antiphlogistic school of chemistry in America, was Dr. Samuel Latham Mitchill, who was elected professor of chemistry and natural history in Columbia College in 1792.

Dr. Mitchill was a man of considerable learning and of varied attainments; he was keenly alive to and fully appreciated the value of practical experience and original research, and, despite the fact that he was among the most persistent and aggressive of the opponents of Priestley, was also generally considered to be one of his staunchest friends. By far the greater number of the contributions relating to the controversy, on chemical philosophy, were published

in the earlier volumes of the *Medical Repository*, New York, one of the earliest of the regular medical publications, founded and edited by Samuel L. Mitchill (1797–1826).

From a pharmaceutical point of view the career of Dr. Mitchill is particularly interesting. He was practically the author of the Pharmacopœia of the New York Hospital, published in 1816, and was subsequently elected a delegate of the Medical Society of the State of New York to the district convention for the Middle States, which met in Philadelphia on the first day of June, 1819. There he was elected vice-president and appointed one of the delegates to the general convention that was to meet in Washington on the first day of January, 1820. As is well known, the general convention met in the Capitol at Washington, on the appointed date, to consider the feasibility and advisability of issuing a National Pharmacopœia. Dr. Samuel L. Mitchill was elected president, and as such deserves considerable of the credit for the successful inauguration of a national standard or Pharmacopœia.

In his controversy with Priestley, Mitchill was ably seconded by John MacLean, a native of Scotland, and a former pupil of Black and of Hope. Dr. MacLean was probably the first in this country to be elected to a chair of chemistry in a purely academical school. He was elected professor of chemistry at Nassau Hall, Princeton, in 1795. Dr. MacLean continued to teach at Princeton until some time after the beginning of the nineteenth century, when he accepted a similar position at William and Mary, in Virginia. The third opponent of Priestley was Dr. James Woodhouse, Priestley's successor as professor of chemistry in the University of Pennsylvania. Dr. Woodhouse was born in Philadelphia, November 17, 1770. He was elected professor of chemistry in 1795, and was probably the first in America to devote his time exclusively to the study and teaching of chemical science. Philadelphia about this time was the most populous and the most progressive city in the country. It was also considered the centre of medical as well as scientific knowledge, and attracted students from all sections of the United States. An excellent descriptive picture of Philadelphia, at the beginning of the nineteenth century, may be found in the memoirs of Benjamin Silliman, who, after his election as professor of chemistry at Yale, came to Philadelphia to absorb the rudiments of that science from Dr. Woodhouse. From these memoirs it would appear that the

lectures on chemistry, freely illustrated by actual experiments, were given in connection with the regular course of medical instruction in the medical department of the University of Pennsylvania. This department occupied a small building on South Fifth Street, opposite the State House yard, that was variously known as Surgeon's Hall, Anatomical Hall, or The Laboratory. It was in this same building

THE LABORATORY AND MEDICAL SCHOOL (1765–1807).

From "The History of Medicine in the United States," by Francis R. Packard, M.D.

that the first chemical society held its weekly meetings, and it was probably in the chemical laboratory, situated on the first floor, that Seybert, Hare, Woodhouse, Bryant and others of the more active members, made their analyses of and experiments with indigenous minerals.

This early chemical society was under the patronage of Drs. Seybert and Woodhouse, and included among its list of active members

such eminent medical practitioners as Dr. Benjamin Rush, John S. Dorsey and John C. Otto. At least one of the then existing apothecaries, John Y. Bryant, was an active member of the society. Mr. Bryant served the society as treasurer and also as a member of the Analyzing Committee. Prominent among the younger members of this society was Robert Hare, the inventor of the oxy-hydrogen blowpipe, and at a later period professor of chemistry in the University of Pennsylvania. Silliman, too, no doubt, attended the meetings of this society; at all events, he became intimately attached to and a warm admirer of Hare, the two working together in a private laboratory that they had contrived to fit up in the basement of their boarding-house.

There are, however, several teachers of the eighteenth century that should still be mentioned. At William and Mary, in Virginia, the Rev. James Madison, later Bishop of Virginia, was elected professor of natural philosophy in 1774. Despite his numerous other duties, Bishop Madison continued to teach until his death in 1812, when he was succeeded by Dr. John MacLean, the one-time professor of chemistry in Nassau Hall, Princeton.

At Yale Prof. Josiah Meigs delivered lectures on natural philosophy from 1794 to 1801. According to one of his pupils, Benjamin Silliman, " he was a gentleman of great intelligence and was well read in the chemical writers of the French school."

The first teacher of chemistry at Harvard, apart from natural philosophy, was Dr. Aaron Dexter, who, while not a brilliant teacher, or, according to an anecdote told by Oliver Wendell Holmes, not a very successful experimenter, was, nevertheless, instrumental in securing for Harvard University at least some of the material with which to lay the firm foundation on which the teaching of the science in that institution now rests. It was Dr. Aaron Dexter who, in 1782, induced Mr. William Erving, a wealthy citizen of Boston, to endow a chair of Chemistry and Materia Medica in the newly organized medical school of the University of Cambridge. To this chair Dr. Dexter was elected in 1783 and continued to teach until 1806, when he was succeeded by Dr. John Gorham, a brilliant lecturer and a very able teacher, who had been a fellow-student with Silliman, in Edinburgh, under Dr. Thomas Hope, then professor of chemistry.

Another chair of chemistry, founded before the beginning of the

nineteenth century, was that in the medical department of Dartmouth College, New Hampshire. This was occupied for several years by Dr. Lyman Spalding, who was elected professor of chemistry and materia medica in 1798.

Dr. Spalding was closely associated in later years with the origin and successful publication of the first United States Pharmacopœia. It was Dr. Spalding who, in 1817, submitted to the New York County Medical Society a project for the formation of a National Pharmacopœia, to be published by the authority of the medical societies and medical schools in the United States. His suggestion was adopted, and he was subsequently elected one of the delegates to the convention, where he was elected a member, and later chairman, of the Committee of Publication, thus being practically the editor of the first United States Pharmacopœia.

After the beginning of the nineteenth century chairs and teachers of chemistry increased rapidly. Of medical schools alone, Dr. James Thacher, in his "History of Medicine in America," enumerates no less than twenty existing in the United States in 1825. Few of the then professors contributed materially to advance the science of chemistry. By far the greater number of these teachers were actively engaged in, or more interested in, the practice of medicine than in chemical research. Notable exceptions were Robert Hare, professor of chemistry in the University of Pennsylvania, and Benjamin Silliman, of Yale, whose achievements in this particular field are so well and so favorably known that it will not be necessary to enumerate them at this time. Another notable exception that should be mentioned was Dr. Parker Cleaveland, who was elected professor of chemistry in Bowdoin College, Maine, in 1820, and who contributed materially to advance the general knowledge of chemical philosophy of his time.

The first quarter of the nineteenth century also saw the introduction of pharmaceutical and technical schools. The first of these, the Philadelphia College of Pharmacy, founded in 1821, elected as its first professor of chemistry Gerard Troost, a particularly able and scholarly man, who had studied chemistry at Leyden and was well versed in the theory as well as in the practice of the science. Troost subsequently became professor of chemistry and mineralogy in the University of Nashville. At the Philadelphia College of Pharmacy, he was followed in 1822 by Dr. George B. Wood, then quite a young

man, who later became well known as an author and also as a teacher in the medical department of the University of Pennsylvania.

The College of Pharmacy of the City of New York, founded in 1829, had as its first professor of chemistry John Torrey, who is deservedly esteemed for his attainments in various departments of science, and who was, at that time, considered one of the most successful instructors in chemistry in the United States.

In the Franklin Institute, Philadelphia, founded in 1824, Dr. W. H. Keating was elected the first professor of chemistry; he was followed several years later by Dr. Franklin Bache, who, as is well known, succeeded Dr. Wood as professor of chemistry in the Philadelphia College of Pharmacy.

In the Rensselaer Polytechnic Institute, Troy, N. Y., also founded in 1824, Amos Eaton was one of the first to teach chemistry.

Probably the first woman to teach chemistry in this country was Mrs. Almira H. Lincoln, the vice-principal of the Troy Female Seminary, who taught chemistry with considerable success in 1830, if not before.

Popular lectures on chemical subjects were probably instituted in Philadelphia in 1807, when Dr. Joseph Parrish gave a series of public lectures and demonstrations. Dr. Parrish continued his courses for several years with considerable success. The same idea was subsequently followed up by Dr. Benjamin Silliman and others, who gave regular courses of popular lectures that contributed very materially to the rapid spread of knowledge of the subject among people who would otherwise take little or no interest in this particular line.

Closely allied to popular lectures was the publication of scientific and technical journals. The first of these was the *American Mineralogical Journal*, published in 1810 and conducted by Dr. Archibald Bruce. This journal had a short and rather precarious existence, but is, nevertheless, interesting as being the pioneer of the numerous similar publications existing at the present time.

It was followed in 1818 by the publication of the *American Journal of Science*, edited by Professor Silliman. This journal has been a most important factor in the development of chemical philosophy.

THE JOURNAL OF THE PHILADELPHIA COLLEGE OF PHARMACY, the pioneer pharmaceutical journal in the English language, was first published in 1825. The history of this venture and its successful continuation has been so recently and so ably told by Professor

Kraemer (A. J. P., 1904, page 223) that it will only be necessary to refer to the facts at the present time.

One other of the early journals that should be mentioned is the *Journal of the Franklin Institute.* This was first published in 1826, and, like the preceding, still enjoys an enviable reputation in its own particular field.

WHEN SHALL HIGH-SCHOOL GRADUATION, OR ITS EQUIVALENT, BE ENFORCED BY COLLEGES OF PHARMACY AS A CONDITION OF ENTRANCE?

By W. M. Searby.

I do not deem it necessary at this time to show by facts or argument the desirability of higher entrance requirements for admission to colleges of pharmacy. This I believe to be so universally conceded that it does not need any further enforcement; neither shall I attempt to show that it is desirable that the minimum requirement should be graduation from a high school (or the equivalent thereof), for this, I believe, is also practically conceded; nor will I go over the ground which I traversed in my paper before the American Pharmaceutical Association in 1902, in which I endeavored to show that high-school graduation was not only desirable, but feasible within a very few years, if concerted action could be secured by a few of the largest colleges. I wish to show in this paper that the time has actually arrived when decisive action should be and could be taken, so that high-school graduation would be actually demanded and enforced within a few years from the present date, considering, first, WHEN shall the advance be made toward this end, and, secondly, *how* shall it be done?

The advantages to be secured by such a course would, in my opinion, include the following:

(1) A more intelligent and studious student body.

(2) Greater uniformity of attainment by the students.

(3) More satisfactory progress by the students while in college, and higher attainments at graduation.

(4) A higher order of class and college spirit.

(5) A more cultured and more highly respected graduate body.

I think the advance should be made now, and that it should be made gradually. I believe the majority of colleges now admit stu-

dents on grammar school graduation, or less. To bring the minimum to high-school graduation would mean an increase of from three to four years of academic instruction. Necessarily, the advance requirement must be made gradually, and in order to give those who are now in school preparing for a pharmaceutical career, or who have left school and are employed in pharmacies, the necessary time to prepare themselves for entrance, some notice of such advance should be generally diffused. If it were made known this year that no student could obtain entrance into a good school of pharmacy in the autumn of 1905 unless he had spent one year in high school, or had fitted himself, through private study, to take an examination covering the same work, these young people would have time to prepare themselves for entrance. And if it were further announced that every year or two additional high school work would be demanded, students would fit themselves to meet the requirements. It will be contended that large numbers of young persons would dodge this unwelcome preparatory study and content themselves either with going to such schools of pharmacy as kept their doors open to them, or would eschew college altogether, and trust to luck in getting through the State Board. This is true, doubtless, of a considerable number; but on the other hand a more desirable class of persons would come forward to seek entrance to a calling that has in it more dignity and higher public appreciation. Some years ago the entrance requirements for schools of pharmacy in Great Britain were somewhat suddenly and greatly advanced. It was expected that these requirements would almost empty the schools. To the astonishment of the faint-hearted ones, the very opposite was the effect, and for several years the number of students in pharmacy was greater than it had ever been, because many persons felt that pharmacy would be on a higher plane, and was, therefore, worthy of the serious attention of ambitious young men. It goes without saying that the intellectual calibre of those who entered pharmacy under the new conditions was considerably superior to that of their predecessors. While I do not anticipate an increased number of students under advanced entrance requirements in this country, I believe that the falling off would only be for one or two years, and that the moral effect of the new conditions would ultimately benefit the schools in the matter of attendance by causing every one that would enter a drug store with a view of following

pharmacy for life, to do so with the foregone conclusion that a course in a school of pharmacy was a necessary condition. At the present time there are thousands of young men in drug stores who have never been to a school of pharmacy and have no intention of going there. It is for us to bring about a condition of things that will make a pharmacy course essential, not necessarily by legal enactment, as in New York, though that is desirable, but from the force of universal sentiment. In medicine the man who essays to practice without a college diploma is regarded, not only by graduates in medicine, but by the public, as a quack. In dentistry it is rapidly becoming so, and, likewise, in the practice of law; yet, it is not many years since our large cities had great numbers of men practising all three of these professions without a college education. In dentistry in particular the change has been brought about with wonderful rapidity, and it has come because the public has realized that the graduates in that profession were the best men. It is for the leaders of pharmacy to bring about a like amelioration in the ranks of our own profession, but we cannot do it by sending into the world illiterate, half-educated graduates, whose general attainments are but little superior to those of the ungraduated. Let it be generally known that the holder of a diploma in pharmacy is, firstly, a man of general culture and, secondly, a man of good pharmaceutical education, and pharmacy will be respected by the public far more than it is now.

Specifically, what steps should be taken at this time to bring about a consummation so devoutly to be wished? Assuming that the American Pharmaceutical Association should commit itself to an expression of opinion in favor of a definite plan whereby, at certain dates, the minimum qualification for entrance should be, firstly, one year; secondly, two years; and, thirdly, graduation from a high school; and, assuming that the Conference of Pharmaceutical Faculties should also endorse the same plan, there would be such a large proportion of the best schools acting upon this procedure, that the effect upon other schools that held out against it would be that they would quickly take second rank in the esteem of pharmacists; and when a college once gets relegated to a second- or third-rate position among its competitors, its days as a successful financial institution are numbered. Such schools would, before long, be compelled to come into line.

But suppose that only a limited number of colleges, now members of the Conference of Pharmaceutical Faculties, should be willing to adopt this plan, what would be the result? If these colleges were among the smaller and less known institutions, the plan would probably be a failure, though that is by no means certain. Speaking for one of these smaller colleges in a remote portion of the country that has already made a beginning in the line here indicated, I would say that it is my impression that up to the present time our college has gained rather than lost by our advanced entrance requirements. We lost heavily for two years, but since that we have regained our attendance in the face of a competition as great as that in any part of the United States; for we have five colleges of pharmacy on the Pacific Coast, with an aggregate population, between British Columbia and Mexico, of only two millions and a half, and the others all admit on lower entrance qualifications than ours.

But if a few of the larger colleges, with their ample resources, their grand history and magnificent prestige, their eminent faculty and ample equipment, should adopt, at a very early date, high school entrance requirements, they would loom up head and shoulders above those who threw their doors open to practically all comers, and it would not be many years before the more lax colleges would find it to their interest to fall into line.

I almost feel like apologizing to the readers of the AMERICAN JOURNAL OF PHARMACY and the pharmacists of America for what has, thus far, been written, because I have treated the whole matter as if it were a commercial one. I have sought to show that the change indicated can be made without financial loss. I now go further and say that it ought to be made, even if it does involve financial loss. We took that position several years ago in our own school and bore our loss bravely, not knowing whether we should ever recoup ourselves. These strong financial institutions are vastly better able to make this experiment than we were. In the world's history few reforms of real value have been attained without sacrifice. Let the colleges of pharmacy show that they have the reformer's spirit, and are willing to do what they know would be best, even if it should entail upon them some financial loss. Such a position as I now advocate, taken by four or five of the largest colleges, would, I feel sure, result in such a large measure of success that they would, forever afterwards, congratulate themselves on the position they had taken.

I do not, at this time, discuss the minimum requirements for graduation. That is a very large subject, and is still more difficult to deal with than the matter of preliminary education. Even the medical and dental colleges, with all their years of experience, have only recently come to a general agreement as to length of time to be consumed in a college course, and, at present, I am not prepared to discuss this subject, because, in my judgment, the two matters can be best discussed separately.

BROMIDE OF POTASSIUM.

By Francis J. Smith.

During the past eighteen months the writer has had occasion to examine a considerable number of samples of bromide of potassium, and, as a comparison of the quality of different manufacturers' goods over such an extended period may be of interest, it has been thought worth while to publish the results.

The salt was titrated in the usual way, and any excess of silver nitrate consumed was calculated into terms of chloride of potassium by the method for estimation of chlorides in presence of bromides given in "Muter's Analytical Chemistry," page 116. Chloride and carbonate are generally the only two impurities met with, and of these the former is usually present in larger proportion than the latter. Some few samples did contain an excessive amount of carbonate, and in those cases the results obtained by the above method would not be absolutely correct; but in the majority of cases, where the amount of carbonate did not exceed the small quantity allowed by the U.S.P., the results would hardly be affected.

Where a larger proportion of carbonate exists, very accurate results can be obtained by first neutralizing with normal hydrobromic acid solution, using phenol phthalein as indicator, calculating the carbonate of potassium thus found into bromide of potassium and deducting this amount from the total bromide of potassium, as estimated subsequently with silver nitrate test solution.

It will be seen, by an examination of the table, that very reliable bromide is supplied by five out of the six manufacturers here represented.

Two samples from A and one sample from B were rejected as failing to answer the U.S.P. tests. From C, however, we find a large proportion of the samples had to be rejected.

In most of these the crystals were small and badly formed; often aggregated into flat cakes, and conveying the impression that they formed the last crystallization from very concentrated mother liquors, which would account for the high percentage of impurities.

1903	A.	1903	B.	1903		C.
	p. c.		*p. c.*		*p. c.*	
Jan. 27	96·8	Feb. 17	98·97	Jan. 22	94·8	excess of KCl and very alkaliue.
Feb. 17	98·9	Mch. 19	95·80[2]	" 24	94·8	" "
Mch. 11	99·5	" 25	98·6	Feb. 20	97·4	
" 19	95·8	April 3	97·0	Mar. 19	90·9	" "
" 25	98·1	" 8	97·0	" 21	98·6	
April 4	99·1	" 9	98·0	April 14	97·0	
" 8	97·0	" 14	99·2	May 12	91·8	" "
" 14	98·0	" 20	99·6	" 16	89·6	" "
July 12	99·3	" 29	99·3	" 20	91·5	" "
Aug. 28	99·15	May 6	99·49	" 26	96·2	bad color and dirty.
Sept. 21	98·0	" 18	99·8	Aug. 21	99·1	
" 25	98·7	" 20	98·4	" 24	93·5	excess of KCl and very alkaline.
" 28	99·3[1]	June 5	99·45	Sept. 29	99·6	
Nov. 13	99·15	" 16	99·45	1904		
" 19	98·5	" 22	99·3	Jan. 17	97·9	
" 25	99·8	" 29	97·0	Feb. 19	99·2	
Dec. 7	98·6	July 1	97·0	Mar. 14	99·9	
" 22	99·4	Aug. 24	99·3	" 22	99·9	
" 24	99·4	1904		" 25	99·9	
1904		Jan. 15	98·8	April 21	95·0	" "
Jan. 15	99·7	" 20	99·9	" 25	92·0	" "
" 26	99·9	Feb. 2	99·4	" 26	99·6	
Feb. 25	99·2	" 25	98·8	May 6	95·8	granulated, bad color and very alkaline.
May 4	99·1	May 4	98·8	" 6	97·0	
" 4	99·2[1]	" 12	97·0	" 9	97·0	
" 7	98·8	" 21	98·7	" 21	97·0	
" 18	97·0	June 9	97·0	June 3	95·7	excess of KCl and very alkaline.

1903	D.
	p. c.
Feb. 17	99·4
April 30	99·6
May 26	99·9
June 3	97·0
" 18	99·3
July 15	99·6
Sept. 2	99·0
" 29	98·9
Dec. 18	98·3
1904	
April 15	99·2

1903	E.
Feb. 3	99·3

1903	F.
Mar. 21	97·74
April 17	98·70

[1] Granulated.

[2] Alkaline.

PHARMACY AND CHEMISTRY AT THE WORLD'S FAIR.

By Carl G. Hinrichs, Ph.C.,
St. Louis University.

(*Continued from p. 314.*)

II.—CEYLON THE ISLE OF SPICE—THE LAND, THE PEOPLE AND THE DRUGS THEY RAISE.

This large island lies to the southward of both Bombay and Calcutta, the main ports of India. Like many tropical lands, such as Mexico and Africa, the coast region is low, while the inland region is quite elevated, even semi-mountainous. Especially in the northern portion of Ceylon do we find an extended low country, though not marshy; this part is known as the Maritime Region. Thus the land diversifies the climate and consequently also the crops.

Although lying just at the foot of the Indian peninsula, still the climate is not that of Southern India, for the ocean tempers the more pronounced changes in weather prevailing in India proper. Living at the leading seaport, commercial city and capital, Colombo, is thus not oppressive; if, however, a change in climate be desired, a trip inland of a hundred miles brings one to the uplands.

Four seasons are distinguished by the natives, namely, the N. E., S. E., S. W. and N. W. monsoons. During the N. E. monsoon the wind comes from the northeast, etc.

The amount of rainfall here, as elsewhere in the tropics, determines two well-marked seasons, the wet and the dry. But even in the so-called dry season, Ceylon enjoys a moderate rainfall; the terrors of the Indian famine are thus unknown to the Cingalese.

The Government is British, as it has been for the last hundred years. The Dutch lost both Ceylon and South Africa to the English during the Napoleonic wars. Both nations have treated the natives well. The lesson of 1776 has been well learned by England, and now no country has greater success with its colonies; in fact, England is the only great nation that finds them not only self-supporting, but even yielding a profit to the "mother country." To develop the resources of the colony, to teach the natives the English language and not to tread on their customs might be called the three cardinal virtues of the British.

The people are of the same stock as the Hindoos. Their features are very regular, and they do remind one of the Caucasian. Like

all people who have lived long in the tropics, they are very swarthy, of average height, quick and intelligent; with long, straight, black hair, knotted at the back and held up by a peculiar comb-ornament, together with their dark eyes and white teeth, they make a very pleasant and striking impression.

The Cingalese tongue is very musical, there being a preponderance of the vowel tones. No attempt is made by the English to do away with this very ancient language, as the Cingalese have a very rich literature. The native tongue is taught in all the English schools of Ceylon.

The men of Colombo wear long, flowing, light garments, as do all the women. The workmen in the country wear only the comfortable loin cloth.

England has established many schools for the natives, common, technical and medical. The medical school of Colombo turns out many physicians learned in the medicine of the Europeans. Dispensaries in charge of such natives furnish free to the people medical and surgical aid. Some graduates start up a private practice, but the greater part of this work is in the hands of the so-called "native physicians." These have learnt by the experience of the ages where the various herbs, roots, etc., are found and when they may be used. Most of their medicines, as exhibited by Ceylon, are medicated oils. In some cases it was said where the European uses the knife, as in severe compound fractures, these native physicians wrap the injured limb in certain leaves, allow it to remain in perfect rest for a week, when they find the bones have knit. What they use is unknown, as their knowledge passes from father to son, and no one outside the family is taken into confidence.

Those following trade have usually studied at one of the technical schools. The gentleman in charge, Mr. Peter de Abrew, is very polite, speaks fluent English, and is well versed in everything Cingalese. In his general appearance and bearing he reminds one of an educated Frenchman.

The resources of Ceylon are mainly agricultural, though they have a very well-developed graphite industry. Spices, drugs and food are no longer a matter of gathering what nature presents in the jungle, but are followed out along strict agricultural lines.

As stated, two agricultural regions are distinguished in Ceylon, viz., the maritime or lowland, where the main products raised are

cocoanuts, cacao, cinnamon, tapioca, rubber, lemon and citronella grasses, and to a less extent white and black pepper, cloves, nutmegs, sugar cane and bananas may also be mentioned. The upland claims cinchona, coffee, tea and cardamom plantations, while rice, their staple, is grown in both regions.

The great farms are called "estates." Labor is cheap, food is plentiful, the ambient air often supplies all the needed garments, while for a little scratching of the soil, nature richly repays the planter with three crops a year.

The first task of the planter is to clear the jungle or native forest. This comprises many large trees fit for the carpenter, and much underbrush and scrub growth. The large trunks are cut and sold as lumber, while the brush and leaves drying form an excellent fuel to burn the remaining trees, which are fired during the dry season. As a result, a good bed of wood ashes covers the already fertile soil. Here and there the great stumps are left.

Plowing is next in order. This is done with wooden plows, pulled by the hardy and patient beast of burden of the East, the bullock. Horses are never used; they are too valuable and could not stand the hard usage. This superficial plowing would in our country be called a mere scratching of the soil.

All coast lands of the tropics are blessed with the cocoanut tree, from which practically all their wants might be supplied. The great importance of this culture to Ceylon is very artistically shown in the exhibit booth.

All planting takes place in the dry season. The cocoanut, husk and all, is planted in nurseries; in about ten days the young tree is above ground. The next six months are trying ones to the planter, as the "milk of the cocoanut" is changed to a very pithy delicacy for both man and beast. The men standing guard shoot the porcupine and wild hog that delight at this stage to eat only the tender sprouts and this pithy substance. When the young tree has absorbed all the nourishment from the nut, and the wild animals will feed no longer thereof, it is transplanted to the orchard in rows 22 feet apart each way. This space allows for the 15-foot sweep of the leaves of the grown plant and also for ventilation. This distance is now being increased to 30 feet.

The tree grows at the rate of a foot a year. When six years old the trees blossom and bear nuts. While no longer in danger of the

four-footed animals it finds a formidable enemy in a large beetle. This beetle feeds on the crown of the tree, and if it succeeds in eating away the crown before the native notices its presence the tree dies. By tying a human hair about this crown the beetle is repulsed, or if his presence is noticed in the crown, a sharp iron spike of about 5 inches in length is jabbed into the crown; the beetle is impaled and drawn out.

The bud is a peculiar, horn-shaped pod, about 2 feet in length; it has a very graceful curve from tip to tip, gradually increasing in diameter to the centre, where it is about 2 inches thick.

Just previous to bursting into flower the pod is full of a sweetish liquid. Cutting off the tip, this liquid exudes, is collected by the native and called "toddy." This peculiar practice does not kill the plant, as does the similar operation of the Mexicans preparing pulque from the agava, but seems to act as does pruning in our orchards.

The collected juice may be treated in several ways. It is concentrated till crystallization begins, and cooled, when the so-called "jaggery" or palm sugar is obtained. This product, as shown, is in irregular, brownish-yellow slices. Again, suppose the juice is exposed to the air, it promptly ferments and alcohol is formed; if the native now distills, he obtains a pale yellowish, pleasant-flavored sort of brandy. This is sold in Ceylon under the name of "arrack." If not distilled, acetous fermentation sets in and a palm vinegar results; this is brownish and not so perfectly clear as is the wine.

The flower is made up of from six to eleven ivory-white petals, each petal being 2 feet in length and spear-shaped. In the dark-green tuft of foliage the flower shows up beautifully and may be seen a mile away.

A month later a cocoanut rests where the flower was. The native climbs up the tree, using a sliding-rope appliance, and cuts the stem. The nut dropping from even the 90-foot and fully grown tree is uninjured, thanks to a thick, hard husk, surrounding an inch thickness of matted fibres, in turn enclosing the nut proper.

The husk is cut, the matting of fibre is removed. This fibre is pale brown and up to a foot in length; mats, cloth and brushes are made from this "coir" fibre. The smooth cocoanut is now exposed and is either sold in the market as such or worked up.

The shell is often used to make dippers, cups, carved receptacles, etc.; being quite hard, it takes a beautiful polish.

Halving the nut, the white meat is removed; this is either grated and dried, thus forming the familiar shreds used by the confectioner, or the halved meats are dried and sold as "coprah" to firms in Marseilles and London, which extract the valued cocoanut oil by either solvents or pressure.

The native is not ignorant of the fact that an oil is hidden in the white meats, for oil of Cingalese manufacture and even a model of an oil mill is shown in this exhibit. Of course this mill looks very primitive. Imagine a very large bell-shaped mortar of wood, having inserted therein a formidable pestle; to this latter a heavy timber is firmly spiked, making an angle of 60° therewith; this is in turn attached to another timber by means of a metallic hinge. This third timber is spiked to a long, heavy beam that presses firmly against the contracted portion of the mortar. Bullocks are hitched to the free end of this horizontal beam and furnish the slow but sure motive power. A very effective rotary and sliding motion results, and, as the cocoanut oil is liquid at the temperatures that prevail in Ceylon, the oil is continually tapped.

The pressed cake is much used as a very valuable stock feed.

Returning to our tree, this often attains a height of 100 feet and may live to be 120 years of age. Such a tree is a straight trunk crowned with a tuft of leaves. These leaves have a sweep of 15 to 20 feet along the midrib; from this outward leaflets, 2 to 4 feet long and 2 inches broad, grow. The midribs are used as bristles for brooms, while the leaflets crossed form very effective lattice-work screens and partitions.

The tree trunk makes excellent lumber, being not hard to work, taking an excellent polish, and with its light-brown color, splashed with the darker-colored veins, makes elegant furniture.

So we see this one plant furnishes shelter, raiment, food, drink and even light to the native, for he uses the oil in his lamp.

While the cocoanut is with the culture of tea the most important, still, cinnamon is usually recalled whenever Ceylon is mentioned, and every one knows it to be the finest in flavor and odor. This cinnamon is shown in large bales 3 feet high and a foot in diameter. When the Dutch controlled the spice trade of the world, they burnt the rest of the previous crop when the new supply came in; thus they kept up both the quality as well as the price. Ceylon cinnamon in those days sold at £5 sterling. The chips used by the vola-

tile-oil distiller and drug miller are also shown; these, like the stick variety, have the outer bark scraped off.

What is now of special interest to those making lemon essences, citral, ionone, etc., are the grass oils. Extensive field cultivation in the maritime region supplies the trade with both lemongrass and citronella oils, of which many brands of native distillers are shown.

It is a remarkable fact that rice is grown in both the upland and the maritime region. Rice is called "paddy," and is the staff of life in the East. Tapioca is also prepared, but to a smaller extent. Plantain flour is made by the housewife from the banana grown in the vegetable garden.

Fibres of commercial importance are the palm fibres "kitul" and palmyra, the latter made from the Palmyra palm; both are brown in color and coarser than the more important coir fibre. What will undoubtedly be of much importance in the future is a long, thin, pure white fibre extracted from the East Indian hemp—*Sansevieria zeylanica.* This plant, from its long, spear-like leaves of light green striped crosswise with dark green, is a favorite in our greenhouses for ornamental effects.

Cacao culture is important; the products from the pod to the finished cocoa are shown; also various brands of the cocoa butter.

Cinchona favors the uplands and Ceylon has an increasing culture of the bark; a tasty case of the quills is shown.

Cardamoms, wild and cultivated, have a very prominent place in the display; this is also an exclusive upland culture.

No country can raise too much rubber, and Ceylon estates in the maritime region are looking after this product.

Cloves, nutmegs, mace, white and black pepper find a more subordinate place in the agriculture, but are shown in many trade qualities.

Undoubtedly Ceylon has the most artistically arranged exhibit in the drug line; the booth is light and airy, suggestive of the Orient. Everything is arranged a la Yankee, to show off to the best advantage and kept scrupulously clean. The educational value resides in the fact that many estate scenes, showing the way they work, the plants in various stages of blossoming and bearing fruit, are tastefully placed above the cases of drugs; thus at a glance we have the history of the drug before us.

THE DRUG TRADE IN JAPAN AND THE ORIENT AS SEEN BY A DRUG TRAVELER.[1]

By Eugene Ross.

While Japan has contributed a very fair number to the list of prominent living chemists of to-day, it was not until within recent years that pharmacy received Government support. There are very stringent laws regulating the practice of medicine, as well as numerous schools for the education of doctors throughout the empire, and it is very apparent that the reason for this was due to the fact that the doctors in Japan furnished the medicine with a single fee for medical advice.

The first official Pharmacopœia in Japan had its origin about nineteen years ago, and this was modeled after the German. The German influence was paramount; professors from that country were brought over and taught the science of medicine, and this influence carried when the Government finally encouraged the advancement of pharmacy by establishing pharmaceutical preparatory schools throughout Japan. The German influence was so pronounced that all medical papers as well as the pharmaceutical text-books were printed in German, giving at the same time the Japanese translation. This influence was further exerted to the end that the chemicals imported into Japan for a number of years were practically all of German makes, preferential duty privileges being directed to this channel.

Pharmacy as applied in Japan may be divided into two classes—the chemist, who receives the title Master of Medicine or Yakuzai Shi, and the Baiyuka, the dealer in patent medicines or prepared remedies.

The chemist can open a pharmacy and dispense prescriptions; he is likewise licensed to examine and pass upon all drugs and chemicals brought into the country, and for this latter service he receives from the applicant, who furnishes the drug for examination, a fee. All drugs and chemicals brought into and sold in Japan must be examined, and a certificate guaranteeing their qualities according to the Pharmacopœia standard must be attached to every package

[1] Mr. Eugene Ross, foreign traveler for Johnson & Johnson, gave an account of his journeys in the Far East, covering a period of over two years, at the pharmaceutical meeting of the Philadelphia College of Pharmacy, on May 16th.

sold. Failure to observe this requirement of the law carries a penalty. As a consequence of this, the quality of the drugs sold in Japan is of a very pure and high standard of excellence.

The Baiyuka, or dealer in patent medicines, is limited exclusively to the sale of licensed preparations or the usual order of proprietary remedies, but he is not allowed to prepare or put up medicines or dispense prescriptions; he is limited entirely to purveying ready-made or patent medicines.

Every article in the line of drugs or chemicals sold in Japan must carry an internal-revenue stamp, and this based on 10 per cent. of the selling price; for illustration, an article which would retail at 20 sen would carry a tax of 2 sen. In Japanese currency a yen is equivalent to 100 sen or 50 cents United States gold.

Japan is a very fertile field for the sale of patent medicines, but it would seem as though the minimum in price carried the maximum in quantity. It is not uncommon to find a package containing 500 or 1,000 little pills, and made by hand as well, and equally well formed, retailed through the Baiyuka for 10 sen. No doubt this condition militates against the efforts of foreign manufacturers in exploiting their products in Japan. The usual selling price of patent medicines is from 2 to 10 sen or 1 cent to 5 cents United States gold.

While the laws are very stringently enforced regulating drugs and chemicals as to their purity, a like condition exists for the sale of the Baiyuka remedies. When a manufacturer wishes to exploit or place a new preparation on the market, he must make application to the governor of the province in which he resides, submitting a copy of the formula of the preparation as well as a list descriptive of its merits and the diseases for which it is recommended to give relief. The formula, with a sample of the article, is sent to the Kencho or Hygienic Laboratory of the district, and the Government chemist in charge makes his report; and if for any reason the formula and sample submitted are found deficient or to contain any drugs poisonous in their nature, or so construed, the application is denied. If, on the other hand, the requirements of the law are fulfilled, a charge of 2 yen is assessed against the applicant, and a license of a like amount must be paid each year to the Kencho for the privilege of selling the article throughout the empire. It is understood, of course, that the stamp tax applies also.

The Government support as given to pharmacy has resulted in a large increase in the number of pharmaceutical schools throughout the empire, so that at the present time they are to be found in about every district in Japan; and in Tokyo, the university where the post-graduate course in the higher branches of science is obtained, is where chemistry and pharmacy have been most successfully applied. In this university is founded one of the most complete chemical and bacteriological laboratories in the world.

In view of this law which grants to chemists the right to inspect and pass upon the chemicals and drugs sold in Japan, many of the importers or wholesale dealers in drugs have had their sons educated in pharmacy and qualified as chemists to perform this office, that is, to inspect their own drugs and certify as to their standard. Any chemist who falsely represents, or attaches his seal to an article not found to be up to the Pharmacopœia standard as to purity, is liable to a fine, and if the offence is committed a second or third time, he is disqualified to practice his profession.

In the foregoing remarks I have referred to the position of native pharmacy. The foreign concessions, three or four in number, in the port cities where all foreigners were granted certain locations for habitation and their business houses, pharmacy is represented by mostly English service, and the customs prevailing in the concessions were on a par as found in any English colony, and as well in the States. The foreign stores in Japan are thoroughly modern and up-to-date establishments, presided over by competent managers and a staff of qualified assistants. The stocks carried are very large and complete in every particular.

In July, 1900, when all foreigners in Japan came under Japanese jurisdiction, and were subject to the laws as applied in Japan to its subjects, the effect upon the foreign pharmacist or chemist was somewhat arbitrary in its application, and no little confusion and annoyance resulted from the enactment of the native laws; but the conditions were met, and in due time the foreigner adapted himself to the state. I do not believe, however, that the restrictions which are in force will stimulate the foreign chemist for any advancement of the business interests. The laws usually applied to economic conditions are especially applicable to the foreign pharmacist or chemist in Japan.

Passing from Japan to China, conditions present themselves under

different aspects. There is no law regulating the practice of pharmacy or medicine in China, and the history of China furnishes very unsatisfactory knowledge as to the native practices of these arts; but the foreign representation in China is second to none in the Far East. The foreign stores are among the finest in the East, and they all have very large capital and interests.

The spirit of democracy which prevails in China has its influence on all business, and while there are no restrictions as to the quality of drugs sold in China, the privilege is anything but abused. There is no doubt that this condition is due to the high character of the men engaged in the business of pharmacy. The English, as well as the other foreign chemists, are invariably graduated from home colleges. The foreign medical men in China, many of whom have served their time as steamer doctors, and settled down in the settlements to pursue their profession, are as thoroughly progressive, and have their local organizations and institute sanitariums and hospitals as complete and modern as any to be found elsewhere, either in America or Europe.

Chinese pharmacy is rather obscure in its scope. The Chinese have very peculiar customs and methods in the use of medicines, and it is very difficult for the foreigner to satisfy their tastes. The native prejudice, of course, has much to do with this, but the Chinese who have come in contact with the foreigners and live near the settlements or foreign concessions, in time learn to adopt the use of foreign-made medicines; it is necessary, however, to cater to their fancies in the many little ways so peculiar to the Chinese. They have a marked preference, as well as antipathy to certain colors, and in medicine these customs particularly prevail. An orthodox Chinaman would never think of taking medicine out of a blue bottle, nor drugs wrapped in white with black printing. Red is happy joss, and it is always to be found as the predominating color in everything of a medical nature. Blue and black are mourning colors, and always are in evidence at funerals, and if there is one thing above all others that the average Chinaman desires, it is to avoid getting under the sod.

There are several very progressive and up-to-date pharmacies managed and owned by Chinese. There are three such in Shanghai, who have numerous branches throughout China, and there is also a very large Chinese drug store in Pekin. These Chinese in most in-

stances have received their education by working in foreign stores or by college education, and they carry very large and complete stocks. They are very straightforward and honorable men in their dealings, and they enjoy the confidence and respect of the foreigners in the settlements where they reside.

The Chinese are a very superstitious race, and as a consequence venders of patent nostrums prey on their susceptibilities in this direction by selling medicines put up in a very peculiar and attractive manner, to which wonderful curative properties are applied. Wealthy mandarins will often pay fabulous sums for a medicine claimed to possess the virtue of giving vigor of youth, and I have known of an instance where a pill about the size of a hickory nut encased in wax was sold at a price of $10.00, this on the strength of the wonderful restorative properties guaranteed for it. Upon examination, this pill was found to be nothing more or less than an extract of ginseng and licorice powder. The great masses in China, however, are on a par with the Japanese, in that they expect a great deal of medicine for a very little money, and the medicines usually sold bring prices ranging from five to ten cents.

There are now in operation two very up-to-date pharmaceutical schools in China, erected for the education of native Chinese, and there is an impetus given to the cause by the introduction of foreign teachers. There are medical colleges also to be found on the same lines.

Hong Kong, an English colony, built on an island, oftentimes called the Gibraltar of the East, is frequently referred to as part of China. The English influence here, of course, is paramount to all others, and the business in Hong Kong is practically controlled by the renowned house of A. S. Watson & Co., Ltd. This company has branches in many of the principal cities of China as well as in the Philippines. They carry enormous stocks and operate thoroughly modern and up-to-date stores.

In the Straits Settlements and Siam the conditions do not change materially. English influences dominate there, as the Settlements are practically an English colony.

In India the same characteristics present themselves as in China and Japan, but the foreign stores, which are in the main operated by English companies, are the largest of their kind in the East. It would require too extensive a report to go into details on the subject of pharmacy applied to India.

In South Africa, which is an English colony, the chemists have all received their education in the home colleges, and very stringent pharmacy laws regulate the practice of the profession there. No finer or more complete pharmacies are to be seen anywhere than in South Africa.

The leading American pharmaceutical products meet with popular favor in South Africa, and there has always been a popular demand for goods of American manufacture on these lines.

REPORT OF THE MEETING OF THE PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.

By Charles H. LaWall.

The twenty-seventh annual meeting of the Pennsylvania Pharmaceutical Association was held at Cambridge Springs, Crawford County, Pa., on June 21, 22 and 23, 1904, the Hotel Rider being the official headquarters.

Cambridge Springs is a popular Western Pennsylvania health resort, which has established a widespread reputation for the variety and excellence of its numerous mineral springs. It is situated on the Erie Railroad, about twenty-seven miles west of Corry, and about thirty miles south of Erie.

The Hotel Rider is a magnificent building, situated on a hill overlooking the town and capable of accommodating about 600 guests. It is eminently well adapted for convention purposes, as it is furnished with every facility for promoting the enjoyment of the guests, and is provided with a complete theatrical hall in which the business sessions can be held to much better advantage than is possible where one of the parlors of the hotel has to be utilized for the purpose, as is usually the case.

It has been the custom in the past to hold the opening session on Tuesday; but this year, on account of the elaborate preparations of the members from the western part of the State, to show their Eastern confreres as much of the surrounding country as possible, it was necessary for President Frailey to call the convention to order on Monday evening. The opening session was attended by many members who had arrived on Sunday and Monday; but the majority of the members not arriving until Tuesday morning, there was not much business transacted aside from the reception of

the credentials of such delegates as were present. The address of welcome to the members of the association and their visiting ladies was delivered by Mr. McGonigle, president of the First National Bank of Meadville, and was responded to by Mr. J. H. Redsecker, of Lebanon, and Mr. John Patton, of York, the latter being called upon by President Frailey to respond for the ladies, quite a number of whom were present.

The session on Tuesday morning was opened at 9.30, and after hearing a few committee reports, President Frailey read his annual address, First Vice-President L. L. Walton, of Williamsport, presiding. The President's address constituted a comprehensive review of numerous subjects, particularly affecting the welfare of retail pharmacists, and, by its clear and concise language, showed that much care and thought had been spent in its preparation. In it, President Frailey referred to the great interest and enthusiasm which had been shown by many members who had joined at the previous annual meeting, and whose work showed that they appreciated the benefits of membership. He issued a warning against the danger of the association losing its identity on account of lack of original effort, and he stated that there were many issues confronting the smaller county and borough organizations which could best be met by applying local remedies. The trading-stamp craze was spoken of at some length, and the members were warned not to succumb to the specious arguments of those who were trying to introduce them to the trade. The difficulty of obtaining properly qualified clerks was spoken of, and the tendency of many druggists to lose their professional standing by their devotion to ultra-commercialism was deplored. The necessity for patent-law revision was touched upon, and in the consideration of the ever-present "cut-rate" question, the Miles plan was unhesitatingly favored on account of the results which had thus far been accomplished through its agency. Particular mention was made of the lack of interest in committee work, upon the part of the members who have been appointed to these important positions. Praise was given to the members of the State Pharmaceutical Examining Board for the introduction of practical examinations in addition to written examinations held by the Board, and the auxiliary Committees upon Membership were congratulated upon the work which had been accomplished by their efforts. The work of the Legislative Com-

mittee, while not as important during the past year as during the previous year, on account of the Legislature not having been in session, was commended in unqualified terms, and it was stated the work done by the Legislative Committee alone should constitute a sufficient reason for membership in the association, and should place solicitations for membership on a business basis, apart from any question of sentiment. The recommendations which were enumerated at the close of the President's address were as follows:

That part of one session be set aside for addresses by Prof. J. P. Remington, Prof. C. B. Lowe and others on the subject of the American Pharmaceutical Association; that the Pennsylvania Pharmaceutical Association draw up resolutions of support to the N.A.R.D., and that an order be drawn upon the Treasurer for the amount of the per capita tax, basing the figures on the membership as it existed on January 1st; that the pharmacy laws be so amended that a certificate for registered manager be granted only to graduates of such colleges of pharmacy as belong to the American Conference of Pharmaceutical Faculties; and that a resolution be passed in favor of the Mann H. R. bill on patent-law revision and favoring a reduction of the tax on alcohol.

The President's address was then referred to a committee consisting of Messrs. Cliffe, Gorgas, Dice, Siegfried and Ballinger, with instructions to report on the recommendations contained therein.

Prof. J. A. Koch, chairman of the Committee on Papers and Queries, then assumed charge of the meeting, and a number of papers were read. Mr. C. N. Boyd, of Butler, Pa., read a paper on the typhoid epidemic by which that city was recently attacked, and related some amusing occurrences of the erroneous ideas which some of the natives of the rural districts formed of the germs during the excitement attendant upon the examination of the various sources of the water-supply. He stated that one farmer was heard to remark that when he arrived at the top of the hill overlooking the town on that morning, he saw swarms of "gems" arising from the town. (It had happened to be a foggy morning.) Another said that he had never believed in those germs because he had often looked for them and had never seen any until a day or so before, when he had seen three in a glass of water, adding, that "they were about as big as potato bugs."

Professor Remington then read a paper on the subject of "The Di-

ploma as a Prerequisite to the Board of Pharmacy Examinations," which will be published in a later issue of this JOURNAL, and in which the matter was ably and exhaustively considered from every point of view; this paper was followed by another on the same subject, contributed by P. H. Utech, of Meadville. These two papers were then referred to the Committee on President's Address, with power to draw up suitable resolutions. A Nominating Committee was appointed consisting of Messrs. Emanuel, Hay, Cliffe, Haley and Steinmetz, and the meeting adjourned until Wednesday at 9 A.M.

On Tuesday afternoon the members of the Association and their ladies were taken for a trolley excursion to Meadville, the county seat of Crawford County, about fifteen miles south of Cambridge Springs. The route led through the picturesque and historic Venango Valley, traversed by Washington on his first mission to the French at Fort Le Beouf in 1753, and many points of interest were seen, among which may be mentioned the borough of Saegertown, where the Pennsylvania Pharmaceutical Association met in 1893, and Allegheny College at Meadville—this institution being the Alma Mater of the late President McKinley. Upon arriving at Meadville the party changed cars and proceeded to Ponce de Leon Springs, the famous summer resort of Meadville, where refreshments were served and the members were afforded an opportunity to drink the spring water, which is highly impregnated with sulphur. The party returned to the Hotel Rider in time for dinner, and in the evening an excellent concert was given by talent from the Conservatory of Music at Meadville, which was appreciated by all who heard it.

The session on Wednesday was opened early, so as to give the members a chance to take the trolley trip to Erie, which had been announced as one of the features of the entertainment programme.

Mr. Talbot, president of the Proprietary Association of America, was introduced by Mr. W. L. Cliffe, and after being tendered the privileges of the floor he read a short address in which the necessity of maintaining the present harmonious relations was emphasized.

Mr. C. E. Vanderkleed, chemist for Mulford & Co., then read a paper upon suppositories, in which a new form of suppository having a block-tin protective cover was described, the advantages being greater stability in all extremes of temperature, and sterility of the suppository at the time of its insertion. The paper was illustrated by tests of the melting-points of suppositories made in various

ways, and was listened to with much attention by all present. The discussion on Mr. Vanderkleed's paper consuming so much time, the meeting was forced to adjourn before it was concluded and it was carried over until the next session.

The excursion to Erie occupied almost the entire day on Wednesday. The trip was made by trolley, the cars leaving at 10.30 A.M. Upon arriving at Erie the party was taken out to the Lake and royally entertained by the Erie druggists. After witnessing a vaudeville performance at the summer theatre, and being served with refreshments, the party started back to Cambridge Springs, arriving there in time for dinner at 7 P.M.

On Wednesday evening an amateur vaudeville production was given by some of the more talented members of the Association, among whom may be mentioned Mrs. McKean, of Erie; Mr. J. P. Remington, Jr., of Philadelphia; Miss Gorgas, of Harrisburg; Mrs. McMurtrie, of Altoona, and Mr. Faries, of Harrisburg.

The next business session of the Association was called to order by President Frailey on Thursday, at 9.30 A.M., and the first order of business was the reading of a number of committee reports, which had been postponed from the earlier sessions for various reasons. Mr. H. L. Stiles, of Philadelphia, chairman of the Committee on Affiliation with Local Associations, read the report of this committee, in which he stated that very little interest had been shown in the matter by the secretaries of the local associations with whom he had endeavored to get in touch, and that only eight replies had been received in answer to more than fifty letters which had been sent out. He stated that this apathy was probably largely due to the fact that the meeting place this year was so far away from the centre of the State, in consequence of which fact very few of the local bodies would send any delegates to represent them.

The report of the Committee on Trade Interests was presented by the chairman, Mr. Charles Leedom, of Philadelphia, in which a resolution was proposed and carried, denouncing the methods of introducing a substitute for a well-known proprietary article, which has appeared upon the market recently.

The most comprehensive report which was presented was that of the Committee on Adulterations, which was read by Mr. R. H. Lackey, of Philadelphia, in the absence of the chairman, Mr. D. J. Thomas, of Scranton. In this report a comprehensive canvass had been

made of the entire State, and circular letters had been sent out to all of the prominent wholesale and supply houses, asking for any information on the subject. Many interesting and valuable replies were received and embodied in the report, which, when published, will, no doubt, form a valuable addition to the literature on the subject of adulteration.

The report of the Committee on Botany was presented and read by the chairman, Mr. C. H. LaWall, after which the discussion of Mr. Vanderkleed's paper on suppositories was resumed, where it had been interrupted the day before.

Mr. C. H. LaWall then read a paper on the " Detection of Aniline Colors and Salicylic Acid in Articles of Food and Drink," which will be published in a later issue of this JOURNAL, and which outlined processes so simple as to readily enable the retail druggist to apply them. This paper was also illustrated by means of specimens.

A paper which had been contributed by Prof. F. X. Moerk was then read, entitled " Laboratory Notes," in which the author suggested some improvements in the application of the tribromphenol reaction to the estimation of carbolic acid, and in which the use of oil of cassia was suggested as a preservative for starch solution for indicator and test purposes. This paper will appear in a later issue of this JOURNAL.

A paper, also entitled " Laboratory Notes," by Willard R. Graham (see page 389), was read, in which the author gave some analytical results of the examination of a variety of substances which had come under his notice recently, the most interesting of which was the statement that cappock oil, an oil obtained from *Eriodendron anfractuosum*, in quantities as low as 0·5 per cent. when added to pure olive oil, would give a reaction similar to that obtained with cottonseed oil with Halphen's test.

A very interesting paper contributed by Second Vice-President B. E. Pritchard, who is also President of the N.A.R.D., was then read by the author. The title was " Mental Myopia," and in it the author discussed trade conditions in his usual forceful and entertaining style.

Mr. L. L. Walton, first vice-president of the Association, then read a carefully prepared article, which considered the advisability of the retail druggist establishing a directory for nurses.

The Nominating Committee then announced that they were prepared to report, and submitted the following nominations:

President, J. A. Koch, Pittsburg; First Vice-President, F. T. Wray, Apollo; Second Vice-President, R. H. Lackey, Philadelphia; Secretary, J. A. Miller, Harrisburg; Treasurer, J. L. Lemberger, Lebanon; Executive Committee, Charles Griffith, Johnstown; W. E. Lee, Philadelphia; L. L. Walton, Williamsport.

The committee also recommended that Bedford Springs be selected as the next meeting place, the time to be June 22, 23 and 24, 1905, with Mr. C. H. Marcy, of Altoona, as local secretary.

The report of the committee was accepted, the candidates as nominated were unanimously elected, and the recommendations of the time and place for the next meeting were unanimously approved.

The report of the Auxiliary Committee on Membership, which was headed by Prof. J. P. Remington and Mr. Louis Emanuel, was read by Professor Remington. It was stated that while the growth of the Association had not reached the phenomenal figures of the previous year, there had been sufficient increase to bring the total membership figures above the 1,000 mark, which places it at the head of all State associations. A list of the individual members who had greatly aided the committee was then read, after which the report of the committee was received with the unanimous thanks of those present.

The report of the Committee on President's Address was then presented by the chairman, W. L. Cliffe. The recommendations of the committee were taken up singly for discussion and adoption, after which the report was unanimously adopted as a whole. The recommendations which were adopted included the endorsement of the Miles plan, the recommendation of the passage of an act amending the pharmacy law so that the applicant for a registered manager's certificate will have to show a diploma from some accredited college of pharmacy, the payment of a per capita tax to the N.A.R.D. on all members in good standing on July 1, 1904, and the endorsement of the Mann H. R. bill No. 13,679.

Mr. C. H. LaWall then read a paper in which attention was called to the prophetic character of the conclusions arrived at by Joseph Priestley in his paper on "Dephlogisticated Air." The meeting then adjourned until 2.30 P.M.

The whole of the Thursday afternoon session and the early part of the evening session of the same day was devoted to the reading of papers; Chairman Koch, of the Committee on Papers and Queries,

having awakened a large amount of interest in this matter with the result that the Pennsylvania Pharmaceutical Association, as usual, heads the list of the various State Pharmaceutical societies both in the number and value of the papers read, and the spirited manner in which some of the papers were discussed showed that the members in attendance were there for profit as well as pleasure.

The following papers were read at these two sessions:

"African Balsam of Copaiba," by Clarence M. Kline. (To be published later in this JOURNAL.)

"Ointment of Mercuric Nitrate," by Clarence O. Snavely. (To be published later in this JOURNAL.)

"Detection of Formaldehyde," by Albert F. Judd. (See page 389.)

"Coarsely Powdered Talc for Making Aromatic Waters," by J. P. Remington, Jr. (See page 390.)

"Profitable Preparations of Petroleum Products," by F. E. Niece.

"The Salus Bill," by R. O. Schmitz.

"The Advantages of an Annual License," by Louis Emanuel.

"Prescribing Proprietary Remedies," by Clement B. Lowe.

"Is it not Time that Graduation from a College of Pharmacy be Required before Registration?" by H. B. Foresman.

"Preventing Frost on Show Windows," by H. F. Ruhl and Charles E. King, respectively.

"Forms of Advertising Best Adapted to the Needs of Retail Druggists," by John R. Thompson and James S. Gleghom, respectively.

"The Traveling Salesman," by W. O. Skelton.

"The Cause of the Popularity of Carbolic Acid as a Means of Committing Suicide," by Louis Emanuel.

The business sessions closed on Thursday evening with the installation of the newly elected officers, after which the association adjourned to convene at Bedford Springs on June 22, 1905.

Among the many entertainment features of the association which had been provided by the Entertainment Committee, which as usual consisted of Messrs. Bransome, Byers and Busch, there were euchre parties for the ladies, bowling matches, guessing contests, etc., and after the regular meeting of the Association had been disposed of and the convention had formally adjourned, the Entertainment Committee were given complete charge of the proceedings. The cus-

tomary prizes, which this year were more numerous and handsome than ever, were then awarded and the evening closed with the serving of refreshments in the dining-room.

The value of these meetings to the retail druggist has often been dwelt upon at length; so let it suffice to say that the interest which was shown this year in a meeting which was held so far away from the centre of the State shows that the Pennsylvania Pharmaceutical Association is to be congratulated upon the fact that in vitality as well as in point of size, it is surpassed by no other State association.

SOME RECENT LITERATURE.

DETECTION OF FORMALDEHYDE.

Albert F. Judd, in a paper to the Pennsylvania Pharmaceutical Association, utilizes the method employed in the detection of formaldehyde in milk as follows: Ten c.c. of the sample are added to 10 c.c. of a 5 per cent. aqueous solution of sodium hydroxide, containing one or two drops of an alcoholic solution of phloroglucin. If the sample contains formic aldehyde the rose color produced lasts for twelve minutes and then fades to a yellowish-brown, which is permanent; if amylic aldehyde is present, the reddish color fades completely in four minutes, whereas if the sample contains ethylic aldehyde the same result is produced in from six to eight minutes.

LABORATORY NOTES.

Willard Graham (*ibid.*) has examined four samples of yellow cinchona bark and found the alkaloidal content to range from 4·8 to 8·9 per cent. Seven samples of red cinchona bark yielded between 5·7 and 8·8 per cent. of total alkaloids. Five samples of Spanish saffron answered the U. S. P. requirements for ash and moisture; one contained, however, considerably more styles than usual. Of three samples of oil of rose examined one had an unusually low congealing point, 7°–9° C. As the result of examinations of olive oil, the author ascertained that when 0·5 per cent. or more of cappock oil[1] was added to olive oil, it produced the same coloration as cottonseed oil in Halphen's test. Mr. Graham states that there is little difficulty in obtaining high-grade table oils.

[1] Cappock oil, probably better known as kapok oil, is obtained by pressing the seeds of *Eriodendron anfractuosum*. The oil is used in soap-making as a substitute for cottonseed oil.

COARSELY-POWDERED TALC FOR MAKING AROMATIC WATERS.

J. P. Remington, Jr. (*ibid.*) obtained from the mines of North Carolina talc in broken pieces, which were broken up and ground in a small mill of the Bogardus type, which consists of a conical feed box, or hopper, which delivers the pieces of material between two discs, revolving horizontally. With this mill he obtained powders of varying degrees of fineness, which were boiled with distilled water containing hydrochloric acid, and afterwards thoroughly washed and dried. A powder ranging between 80 and 120, *i. e.*, one which would pass through a sieve of 80 meshes to the inch and retained by a 120 sieve, was found to be the most satisfactory in making the following aromatic waters: Anise, fennel, cinnamon, peppermint, spearmint and camphor. H. K.

THE PURIFICATION OF WATER SUPPLIES.

This subject has been taken up by the U. S. Department of Agriculture, and on May 7th, Bulletin No. 64, of the Bureau of Plant Industry, entitled "A Method of Destroying or Preventing the Growth of Algæ and Certain Pathogenic Bacteria in Water Supplies," and prepared by George T. Moore, Pathologist and Algologist, in charge of Laboratory of Plant Physiology, and Karl F. Kellerman, Assistant in Physiology, was issued.

The authors state that "while the best known cases of water pollution are those due to the presence of typhoid and other germs which have given rise to serious epidemics, there are a vastly greater number of water supplies which are rendered unfit for use, not because they are dangerous to public health, but on account of the very offensive odor and taste produced in them by plants other than bacteria."

Data furnished by the leading engineers and superintendents of water companies, in reply to a circular letter sent to them, show that the trouble caused by algæ in water supplies belongs to no particular section of the country, but is of wide distribution, extending from Maine to California, and from Minnesota to Texas, and that it is of the most serious kind, in some instances rendering the water wholly unfit for use.

Because of the unsatisfactory results yielded by the methods now in use for eliminating algæ from water supplies, or because of their great expense, the authors decided to take up the biological phase

of the problem, and see what results would be yielded by making a study of the physiology of the organisms under laboratory conditions, the object being to discover some substance which, because of its toxic action on the algæ, would prevent their growth in water supplies.

In determining such a physiological method it was necessary to consider not only that the remedy must be cheap enough for practical purposes and readily available, but that it must be harmless to man under the conditions used. A large number of substances were experimented with, but copper sulphate gave the most satisfactory results. As stated by the writers, "this salt has a very high toxicity for algæ, and experiments with a number of the forms usually found in reservoirs, and the source of much trouble, have shown that inconceivably small amounts of copper are poisonous in a high degree."

In the method proposed the death points of the algæ were determined by using Van Tieghem cells. Accurate solutions were made with distilled water and 200 c.c. of each solution was pipetted into an Erlenmeyer flask. The algæ, if filamentous forms, were rinsed; if free-swimming, they were concentrated by the Sedgwick-Rafter[1] method from 500 c.c. volume to 5 c.c. volume, and this was added to the treated water, the inaccuracy due to this addition being disregarded. At the same time control experiments were also carried on.

The species tested are divided into three groups, as follows: (1) Those with death points at higher concentrations than 1 part copper sulphate to 1,000,000 parts of water; (2) those with death points between 1 to 1,000,000 and 1 to 5,000,000; and (3) those with death points at greater dilutions than 1 to 5,000,000.

Having demonstrated the effectiveness of copper sulphate as an agent for the destruction of algæ, the authors discuss the effects of copper and its compounds on the animal economy, and arrive at the conclusion that "even if the maximum concentration of copper sulphate necessary to destroy algæ in reservoirs were maintained indefinitely, the total absorption from daily use would be very far below an amount that could produce the least unpleasant effect." In other words, taking a dilution of 1 to 1,000,000, which would in all

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[1] Whipple: "The Microscopy of Drinking Water." New York, 1889, p. 15.

cases be sufficiently toxic to prevent the growth of polluting forms of algæ, it would be necessary to drink over 20 quarts of the water a day before an amount of copper sulphate which is recognized as harmless would be introduced into the system, while it would take more than 50 quarts to produce unpleasant or undesirable effects.

There are also two other factors to be considered which would seem to render the danger from the use of copper sulphate in the manner prescribed entirely nil. (1) In most cases the use of a solution of maximum dilution (1 to 1,000,000) would be sufficient to kill all forms and would perhaps not have to be resorted to again for at least some time, or at most very much weaker solutions could be used. (2) Very little of the copper would be found in the water after a few hours, it being combined by the algæ and precipitated in other ways.

The point to be borne in mind in applying the copper sulphate is that it should be thoroughly distributed. The method recommended and used by the Department of Agriculture is as follows: Place the required number of pounds of copper sulphate in a coarse bag—a gunny sack or some equally loose mesh—and, attaching this to the stern of a rowboat near the surface of the water, row slowly back and forth over the reservoir, on each trip keeping the boat within 10 to 20 feet of the previous path. In this manner about 100 pounds of copper sulphate can be distributed in one hour. By increasing the number of boats, and, in the case of very deep reservoirs, hanging two or three bags to each boat, the treatment of even a large reservoir may be accomplished in from four to six hours. There are a few other details to be observed in some cases, but as the Department desires that those contemplating the use of the method consult with them first before making a test of the method, these will not be given.

It remains to be said that the method has been tested in water-cress beds having an extensive growth of algae, and also in water reservoirs, and that the results have been very encouraging.

In summarizing their experiments with pathogenic bacteria, the authors state that at ordinary temperatures 1 part of copper sulphate to 100,000 parts of water destroys typhoid and cholera germs in from three to four hours. The copper can be eliminated from the water with considerable ease, and thus is afforded a practical method of sterilizing large bodies of water when this becomes desirable.

F. Y.

THE INTERNATIONAL CONGRESS OF ARTS AND SCIENCE.

The programme has now been issued of the congress to be held as part of the Louisiana Purchase Exposition from September 19th to 25th of the present year. The purpose and plan of the congress are thus described:

The idea of the congress grows out of the thought that the subdivision and multiplication of specialties in science has reached a stage at which investigators and scholars may derive both inspiration and profit from a general survey of the various fields of learning, planned with a view of bringing the scattered sciences into closer mutual relations. The central purpose is the unification of knowledge, an effort toward which seems appropriate on an occasion when the nations bring together an exhibit of their arts and industries. An assemblage is, therefore, to be convened, at which leading representatives of theoretical and applied sciences shall set forth those general principles and fundamental conceptions which connect groups of sciences, review the historical development of special sciences, show their mutual relations and discuss their present problems.

The speakers to treat the various themes are selected in advance from the European and American continents. The discussions will be arranged on the following general plan:

After the opening of the congress on Monday afternoon, September 19th, will follow, on Tuesday forenoon, addresses on main divisions of science and its applications, the general theme being the unification of each of the fields treated. These will be followed by two addresses on each of the twenty-four great departments of knowledge. The theme of one address in each case will be the fundamental conceptions and methods, while the other will set forth the progress during the last century. The preceding addresses will be delivered by Americans, making the work of the first two days the contribution of American scholars.

On the third day, with the opening of the sections, the international work will begin. About 128 sectional meetings will be held on the four remaining days of the congress, at each of which two papers will be read, the theme of one being suggested by the relations of the special branch treated to other branches; the other by its present problems. Three hours will be devoted to each sectional

meeting, thus enabling each hearer to attend eight such meetings, if he so desires. The programme is so arranged that related subjects will be treated, as far as possible, at different times. The length of the principal addresses being limited to forty-five minutes each, there will remain at least one hour for five or six brief communications in each section. The addresses in each department will be collected and published in a special volume.

It is hoped that the living influence of this meeting will be yet more important than the formal addresses, and that the scholars whose names are announced in the following programme of speakers and chairmen will form only a nucleus for the gathering of thousands who feel in sympathy with the efforts to bring unity into the world of knowledge.

The organization of the congress consists of:

Director of Congresses—Howard J. Rogers.

Administrative Board—Nicholas Murray Butler, president of Columbia University, chairman; William R. Harper, president of the University of Chicago; R. H. Jesse, president of the University of Missouri; Henry S. Pritchett, president of the Massachusetts Institute of Technology; Herbert Putnam, Librarian of Congress; Frederick J. V. Skiff, director of the Field Columbian Museum.

Officers of the Congress—President, Simon Newcomb, retired professor U. S. N.; Vice-Presidents, Hugo Münsterberg, professor of psychology in Harvard University; Albion W. Small, professor of sociology in the University of Chicago.

The speakers and chairmen in the subjects of more especial interest to pharmacists are:

DIVISION A—NORMATIVE SCIENCE.

Speaker, Prof. Josiah Royce, Harvard University.

DEPARTMENT I—PHILOSOPHY.

Section d, Methodology of Science—Chairman, Prof. James E. Creighton, Cornell University; Speakers, Prof. Wilhelm Ostwald, University of Leipzig; Prof. Benno Erdmann, University of Bonn.

DIVISION C—PHYSICAL SCIENCE.

Speaker, Prof. Robert S. Woodward, Columbia University.

DEPARTMENT 9—PHYSICS.

Speakers, Prof. Edward L. Nichols, Cornell University; Prof. Carl Barus, Brown University.

Section a, Physics of Matter—Chairman, Prof. Samuel W. Stratton, director of the National Bureau of Standards, Washington; Speakers, Prof. Robert W. Wood, Johns Hopkins University; Prof. Francis E. Nipher, Washington University.

Section b, Physics of Ether—Chairman, Prof. Henry S. Carhart, University of Michigan; Speakers, Prof. James Dewar, Royal Institution, London; Prof. DeWitt B. Brace, University of Nebraska.

Section c, Physics of the Electron—Chairman, Prof. Charles R. Cross, Institute of Technology, Boston; Speaker, Prof. Ernest Rutherford, McGill University, Montreal.

DEPARTMENT 10—CHEMISTRY.

Chairman, Prof. James M. Crafts, Massachusetts Institute of Technology; Speakers, Prof. John U. Nef, University of Chicago; Prof. Frank W. Clarke, chief chemist, U. S. Geological Survey.

Section a, Inorganic Chemistry—Chairman, Prof. John W. Mallet, University of Virginia; Speaker, Prof. Henri Moissan, The Sorbonne, member of the Institute of France.

Section b, Organic Chemistry—Chairman, Prof. Albert B. Prescott, University of Michigan; Speakers, Prof. Rudolf Fittig, University of Strassburg; Prof. William A. Noyes, National Bureau of Standards.

Section c, Physical Chemistry—Chairman, Prof. Wilder D. Bancroft, Cornell University; Speakers, Prof. J. H. Van't Hoff, University of Berlin; Prof. Arthur A. Noyes, Massachusetts Institute of Technology.

Section d, Physiological Chemistry—Chairman, Prof. Wilbur O. Atwater, Wesleyan University; Speakers, Prof. Albrecht Kossel, University of Heidelberg; Prof. Russell H. Chittenden, Yale University.

DEPARTMENT 13—BIOLOGY.

Chairman, Prof. William G. Farlow, Harvard University; Speakers, Prof. Jacques Loeb, University of California; Prof. John M. Coulter, University of Chicago.

Section a, Phylogeny—Chairman, Prof. T. H. Morgan, Bryn Mawr; Speakers, Prof. Hugo de Vries, University of Amsterdam; Prof. Charles O. Whitman, University of Chicago.

Section b, Plant Morphology—Chairman, Prof. William Trelease, Washington University, St. Louis; Speakers, Prof. Frederick O.

Bower, University of Glasgow; Prof. Karl F. Goebel, University of Munich.

Section c, Plant Physiology—Chairman, Prof. Charles R. Barnes, University of Chicago; Speakers, Prof. Julius Wiessner, University of Vienna; Prof. Benjamin M. Duggar, University of Missouri.

Section d, Plant Pathology—Chairman, Prof. Charles E. Bessey, University of Nebraska; Speaker, Prof. Joseph C. Arthur, Purdue University.

Section e, Ecology—Chairman, Prof. Conway MacMillan, University of Minnesota; Speakers, Prof. Oskar Drude Kön, Technische Hochschule, Dresden; Prof. Charles Flahault, director of the Botanic Institute, Montpellier, France.

Section f, Bacteriology—Chairman, Prof. Harold C. Ernst, Harvard University; Speakers, Prof. Edwin O. Jordan, University of Chicago; Prof. Theobald Smith, Harvard University.

Section g, Animal Morphology—Chairman, Dr. Leland O. Howard, Department of Agriculture, Washington, D. C.; Speakers, Prof. Charles B. Davenport, University of Chicago; Prof. Alfred Giard, The Sorbonne, member of the Institute of France.

Section h, Embryology—Chairman, Prof. Simon H. Gage, Cornell University; Speakers, Prof. Oskar Hertwig, University of Berlin; Prof. William K. Brooks, Johns Hopkins University.

Section i, Comparative Anatomy—Chairman, Prof. James P. McMurrich, University of Michigan; Speakers, Prof. Max Fürbringer, University of Heidelberg; Prof. Yves Delage, The Sorbonne, member of the Institute of France.

Section j, Human Anatomy—Chairman, Prof. George A. Piersol, University of Pennsylvania; Speakers, Prof. Wilhelm Waldeyer, University of Berlin; Prof. H. H. Donaldson, University of Chicago.

Section k, Physiology—Chairman, Dr. S. J. Meltzer, New York; Speakers, Prof. Max Verworn, University of Göttingen; Prof. William H. Howell, Johns Hopkins University.

DEPARTMENT 17—MEDICINE.

Chairman, Dr. William Osler, Johns Hopkins University; Speakers, Dr. William T. Councilman, Harvard University; Dr. Frank Billings, Rush Medical College.

Section a, Public Health—Chairman, Dr. Walter Wyman, surgeon-general of the U. S. Marine Hospital Service; Speakers, Prof. Wil-

liam T. Sedgwick, Massachusetts Institute of Technology; Dr. Ernest J. Lederle, Commissioner of Health, New York City.

Section b, Preventive Medicine—Chairman, Dr. Joseph M. Mathews, president of the State Board of Health, Louisville, Ky.; Speakers, Prof. Ronald Ross, F.R.S., School of Tropical Medicine, University College, Liverpool; Prof. Angelo Celli, University of Rome.

Section c, Pathology—Chairman, Prof. Simon Flexner, director of the Rockefeller Institute; Speakers, Prof. Felix Marchand, University of Leipzig; Prof. Johannes Orth, University of Berlin.

Section d, Therapeutics and Pharmacology—Chairman, Dr. Hobart A. Hare, Jefferson Medical College; Speakers, Sir Lauder Brunton, F.R.S., London; Prof. Mathias E. O. Liebreich, University of Berlin.

Section e, Internal Medicine—Chairman, Prof. Frederick C. Shattuck, Harvard University; Speakers, Prof. Clifford Allbutt, F.R.S., University of Cambridge; Prof. William S. Thayer, Johns Hopkins University.

Section f, Neurology—Chairman, Prof. Lewellys F. Barker, University of Chicago; Speakers, Prof. Shibasaburo Kitasato, University of Tokio; Prof. James J. Putnam, Harvard University.

Section g, Psychiatry—Chairman, Dr. Edward Cowles, Boston; Speakers, Prof. Th. Ziehen, University of Berlin; Dr. Charles L. Dana, New York City.

Section h, Surgery—Chairman, Prof. Carl Beck, Post-Graduate Medical School, New York; Speaker, Prof. Nicholas Senn, Rush Medical College, Chicago.

Section i, Gynecology—Chairman, Prof. Howard A. Kelly, Johns Hopkins University; Speakers, Dr. L. Gustave Richelot, member of the Academy of Medicine, Paris; Prof. John C. Webster, Rush Medical College, Chicago.

Section j, Ophthalmology—Chairman, Dr. George C. Harlan, Philadelphia, Pa.; Speaker, Dr. Edward Jackson, Denver, Col.

Section k, Otology and Laryngology—Chairman, Prof. William C. Glasgow, Washington University, St. Louis; Speakers, Sir Felix Semon, C.V.O., physician extraordinary to the King, London; Dr. J. Solis-Cohen, Jefferson Medical College.

Section l, Pediatrics—Chairman, Prof. Thomas M. Rotch, Harvard University; Speakers, Prof. Theodore Escherich, University of Vienna; Prof. Abraham Jacobi, Columbia University.

DEPARTMENT 18—TECHNOLOGY.

Chairman, Chancellor Winfield S. Chaplin, Washington University, St. Louis; Speakers, Prof. Henry T. Bovey, F.R.S., McGill University, Montreal; Mr. John R. Freeman, Providence, R. I.

Section a, Civil Engineering—Chairman, Prof. William H. Burr, Columbia University; Speakers, Dr. J. A. L. Waddell, consulting engineer, Kansas City; Mr. Lewis M. Haupt, consulting engineer, Philadelphia.

Section b, Mechanical Engineering—Chairman, President Alexander C. Humphreys, Stevens Institute of Technology; Speakers, Prof. A. Riedler, Königliche Technische Hochschule, Berlin; Prof. Albert W. Smith, Leland Stanford, Jr., University.

Section c, Electrical Engineering—Chairman, Prof. Arthur E. Kennelly, Harvard University; Speakers, Signor G. Marconi, Italy; Prof. Michael I. Pupin, Columbia University.

Section d, Mining Engineering—Chairman, Mr. John Hays Hammond, New York City; Speakers, Prof. Robert H. Richards, Massachusetts Institute of Technology; Prof. Samuel B. Christy, University of California.

Section e, Technical Chemistry—Chairman, Prof. Charles F. Chandler, Columbia University; Speakers, Prof. Otto N. Witt, Königliche Technische Hochschule, Berlin; Prof. William H. Walker, Massachusetts Institute of Technology.

Section f, Agriculture—Chairman, Hon. James Wilson, Secretary of Agriculture, Washington; Speakers, Prof. Léon Lindet, National Agronomic Institute, Paris; Prof. Liberty H. Bailey, Cornell University.

CORRESPONDENCE.

THE AMERICAN PHARMACEUTICAL ASSOCIATION—SCIENTIFIC SECTION.

To the Members of the American Pharmaceutical Association:

The Committee on Scientific Papers herewith invites papers of scientific interest for presentation to the Section at the fifty-second annual meeting, which will be held at Kansas City, Mo., beginning September 5th.

Believing that the interest in subjects presented is much increased when the papers are printed and ready for distribution at the meetings of the Section, the Committee urges the contributors to send

their papers to the chairman as early as convenient, certainly not later than July 10th.

It is the intention of the committee that all papers accepted for presentation to the Section shall there receive due consideration. In order to accomplish this, and to do away with the necessity of reading many papers by title, it will be essential that strict compliance with Article IV of Chapter 9 of the By-Laws (see Proceedings A. Ph. A., vol. 50, page 1134) be insisted on: "Any person preparing a paper for the Association which shall require more than ten minutes for its reading, must accompany the same with a synopsis which can be read within ten minutes' time. The paper and synopsis must both be furnished the committee of the particular Section to which it refers previous to the first session."

CHAS. E. CASPARI, *Associate.* W. A. PUCKNER, *Chairman,*
EUSTACE H. GANE, *Secretary.* 73 Wells Street, Chicago.

OBITUARIES.

M. LEIDIÉ, the chief pharmacist of the Necker Hospital, Paris, died November 25, 1903, in his forty-eighth year.

M. Leidié had been chief pharmacist at the Necker Hospital for twenty-two years. He was a member of the Society of Pharmacy of Paris, and had been elected to serve as annual secretary in 1892 and as president in 1899. M. Leidié had done considerable research-work on the metals of the platinum group.

ROBERTS BARTHOLOW, Professor Emeritus of Materia Medica in Jefferson College, died in Philadelphia, May 10, 1904, in his seventy-third year.

Dr. Bartholow, who was well known as an author on subjects relating to materia medica and therapeutics, was born in New Windsor, Carroll County, Md., on November 28, 1831, and obtained his degree in medicine from the University of Maryland in 1852. He served as surgeon in the Union Army during the War of the Rebellion. Dr. Bartholow was elected Professor of Materia Medica and Therapeutics in Jefferson Medical College, Philadelphia, in 1879, and was made Professor Emeritus in 1893.

EUGENE DIETRICH, the founder and president of the advisory board of the well-known Chemische Fabrik, Helfenberg, Germany,

died at his home in that city on April 15, 1904, in the sixty-fourth year of his age.

Mr. Dietrich, who was probably the pioneer manufacturer of pharmaceutical galenicals in Germany, succeeded in developing a business and establishing a reputation extending far beyond the borders of his native country.

The annual reports of the scientific work done in connection with his manufacturing establishment, embodied in the well-known "Helfenberger Annalen," are generally recognized as having scientific merit, and have been liberally quoted from by the pharmaceutical journals of all countries. M. I. W.

PHILADELPHIA COLLEGE OF PHARMACY.

MINUTES OF THE QUARTERLY MEETING.

The quarterly meeting of the members of the Philadelphia College of Pharmacy was held June 27, 1904, in the Library, at 4 o'clock, the President, Howard B. French, presiding. Nineteen members were present. The minutes of the annual meeting, held March 28, 1904, were read and approved. The minutes of the Board of Trustees for March, April and May were read by the Registrar, Jacob S. Beetem, and approved.

The Historical Committee had no report to make at this time. The Committee on Necrology reported the death of two members during the year, viz., Dr. William H. Webb and Mr. Frank Luerssen. Memoirs of these members were published in the AMERICAN JOURNAL OF PHARMACY for July, pages 348–349.

The delegates to the Pennsylvania Pharmaceutical Association, by their chairman, H. L. Stiles, made a verbal report; a full report will be published in the August number of this JOURNAL.

The President made the following appointments:

Historical Committee—George M. Beringer, William J. Jenks, Henry Kraemer, Jacob M. Baer, Martin I. Wilbert.

Committee on Necrology—Henry Kraemer, Gustavus Pile, Samuel P. Sadtler.

Committee on Nominations—C. B. Lowe, William McIntyre, Martin I. Wilbert, Joseph P. Remington, Joseph W. England.

Delegates to American Pharmaceutical Association—Joseph P. Remington, Henry Kraemer, Mahlon N. Kline, W. L. Cliffe, C. B. Lowe.

Prof. Henry Kraemer proposed an addition to the By-Laws, as follows: To be Section 20 of Article VIII. A Committee on Membership, consisting of three members, shall be appointed by the President, annually, at the stated meeting in June. All applications for membership shall be reported to this committee, and it shall be the duty of this committee to consider the ways of increasing the membership, and to report annually in June on the status of the membership in the College. Action on the matter was deferred till the next stated meeting.

Mr. England moved that the Secretary of the College be authorized to make such abstracts of the proceedings of the Board of Trustees as may be deemed proper for publication in connection with the minutes of the College meetings, when Mr. Beringer moved to amend "that such abstracts be first submitted to the President for approval." The motion, as amended, was then adopted.

ABSTRACTS FROM THE MINUTES OF THE BOARD OF TRUSTEES.

The Committee on Instruction recommended that an auxiliary course of instruction be established in the College for students in the first year. Instruction will be given in chemical and pharmaceutical arithmetic; the instruction in this branch to be compulsory.

The Committee also recommended that Charles H. LaWall be elected Instructor in Pharmaceutical Mathematics.

The following named were elected active members: James A. Ferguson, C. Stanley French, E. R. Kennedy, M.D., G. Nelson Thompson, John T. Harbold, and as associate member, William G. Letzkus.

The Committee on Examination reported that the third year examinations proved that the mid-year examination was of decided advantage, stimulating the members of the class and raising the general class average.

M. N. Kline was elected Chairman of the Board of Trustees; G. M. Beringer, Vice-Chairman, and Jacob S. Beetem, Registrar, for the ensuing year.

The Property Committee reported that the College is in good condition.

The Committee on Instruction presented their annual report. This report embraces reports from the members of the Faculty for the year. In the Department of Pharmacy it was recommended that with the month's extension of the third year course there be given more time to Magistral Pharmacy and Pharmaceutical Legislation, and that the optional course in Prescription Compounding be abandoned and be included in the regular course. The course in Commercial Training is now a part of the established instruction of the College and increased interest in it is very general.

Department of Chemistry: The Professor believes that the course in Chemical Arithmetic will be a distinct benefit in overcoming deficiencies in this branch. Additional time will also be given to the subjects of Proximate Analysis and Separation, and Food Adulteration.

Department of Analytical Chemistry: The innovation of having quizzes in this department has proven to be of much value. The resignation of the instructor, Mr. E. E. Wyckoff, was presented and accepted with regret.

Department of Pharmacognosy: Mr. Herbert J. Watson, the instructor, tendered his resignation on account of ill health. It was accepted with regret.

Department of Materia Medica and Physiology: The first year students in this branch passed an unusually good examination.

C. A. WEIDEMANN, M.D., *Secretary.*

THE CHICAGO COLLEGE OF PHARMACY, located for the past twenty years at 465 and 467 State Street, has moved into new quarters at the N. W. corner of Michigan Boulevard and Twelfth Street. The new building is five stories high and has windows on four sides. It is admirably located and furnishes ample accommodations for lectures and laboratory work.

NOTES AND NEWS.

THEODORE WEICKER, Editor of *Merck's Report* and member of the firm of Merck & Co., New York, has by mutual agreement retired from that firm.

The other member of the firm, Mr. George Merck, will continue the business as heretofore, under the same firm name.

Mr. Weicker has been prominently identified with the house of Merck for more than twenty years, and his influence in its council has been recognized both here and abroad. In 1887 he organized the American branch of the house, which has been characterized by high-plane and progressive business methods. The next year he was elected a life-member of the New York College of Pharmacy.

It is not Mr. Weicker's purpose to relinquish his active business life, and on his return from Europe in the spring of 1905, he will re-establish himself in New York under the firm name of THEODORE WEICKER COMPANY, manufacturers and importers of chemicals and drugs. Meantime, letters and telegrams to him should be addressed care Deutsche Bank, Berlin.

AMERICAN PHARMACEUTICAL ASSOCIATION.—The Fifty-second Annual Meeting will be held at Kansas City, Mo., September 5–10 inclusive, beginning at 3 P.M. on Monday, the 5th. The headquarters of the Association will be at the Coates House, where by special arrangement a rate of $2.50 per day and upwards, on the American plan, has been secured.

THE MARYLAND COLLEGE OF PHARMACY, having become a department of the University of Maryland, has been installed in the new University Building, in Greene Street, Baltimore. The members of the College faculty other than Prof. D. M. R. Culbreth, who is already identified with the University, were elected members of the University Faculty at a meeting on July 7th.

PROF. H. H. RUSBY, of the New York College of Pharmacy, according to *Torreya*, is now at Kew, engaged in the critical comparison of South American material from the herbarium of the New York Botanical Garden with that preserved in the herbarium of the Royal Gardens.

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PHARMACY AND CHEMISTRY AT THE WORLD'S FAIR.

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Professor of Chemistry, Marion-Sims Dental College.

(*Continued from p. 375.*)

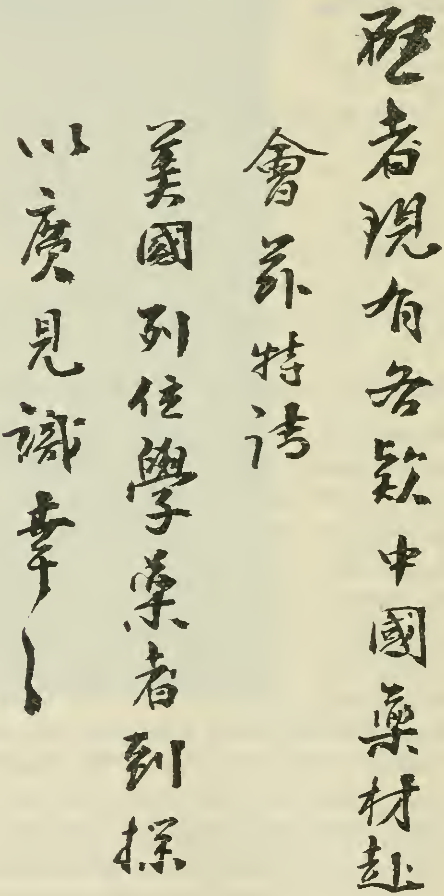
III. CHINA: ITS DRUGGISTS, MEDICINES AND CHEMICAL MANUFACTURES.

On the following page we have a Chinese note, specially written for us by the Imperial Chinese Secretary to the readers of the AMERICAN JOURNAL OF PHARMACY. Beginning at the upper right-hand corner, reading down the column, and then down the next to the left, it states: "*We invite the readers of America's oldest drug journal to see the Chinese medicines;*" and it will well repay any one to spend a good portion of his time studying the Chinese exhibit shown in the Liberal Arts Building.

China is a country with a glorious past, and the centuries of experience have taught all trades the wisdom of our trite saying that the shoemaker should stick to his last. The readers will then not be surprised to learn that the Chinese druggist states on his shop signs that he sells drugs and medicines; also, that if you should ever enter such a store, you would not find cigars, soda-water, stationery, paints or glassware, but only drugs and medicines. The Chinese druggist makes no pretensions to being a professional man, but he is a man of conscience, for no Chinese druggist sells a grain of opium to its unfortunate habitue. Would that we could say as much for our entire drug trade!

The Chinese drug-stores are similar to other Chinese shops; in size they vary of course according to the location, size of town and

importance of their trade. The entire front is open to the street during business hours; at night the shop is closed tightly with shutters so that no one may enter. About the walls are shelves, and all this space is taken up with an array of chinaware (porcelain) pots containing drugs. These pots remind one of the similar receptacles



used in the seventeenth century. They are urn-like in shape, and are closed with a porcelain lid. A counter, upon which all drugs are cut, weighed out, wrapped up and sold to the customer, has a prominent place. There is also a desk, where we find the scrupulously kept account books, writing material and the ever-present Chinese counting-board. So expert and rapid is the Chinese calcu-

lator on this board that the English banks at the treaty ports have such men check up the intricate problems of Chinese fluctuating currency into British pounds and pence after the English cashier has made his estimate. If there be a discrepancy, it is found that the Chinese is right. This board consists of about ten rods, each having seven sliding balls, two of which are above a wooden partition and five below; by sliding these up and down the calculator does the most difficult of additions, subtractions, multiplications and divisions.

We might almost say the appliances and apparatus of the druggist are his deft hands, from the very few aids he uses. Upon the counter is a lever-knife similar to our plug-tobacco cutter; this is firmly fixed to the table, and he cuts his roots, barks, etc., with this. Hard drugs, such as betel nuts, are opened up by a peculiar triangular knife blade. The mortar is not like ours; it is made of bronze or iron, and looks like the water-holder found on many grindstones. In length it is about 2 feet, in width about 2 to 4 inches; this trough has an elliptical grinding surface. Playing in this is a wheel of metal having an axle; the projecting axle is firmly grasped. With a pressing forward and backward motion, a thorough pulverization is possible. To remove oil from contused seeds and to strain oils they use the bibulous Chinese paper.

The Chinese grain measures are bronze-bound tubs, the throat being contracted, affording a more accurate stricken measure than we practise here in the West. Chinese liquid medicines kept and sold in shops are few; so they have no need for measures, but only appliances for weighing.

The appliances for weighing are two; the common equal-arm balance for fine weighing, drug and specie, and the steelyard, used for less accurate and heavy commercial work. The steelyard is the common Chinese balance. It consists of a wooden rod, at one end of which a bronze pan is suspended by four strings; near this are either two or three string supports, each used according as to whether heavier or lighter weighing is to be done, while beyond is the scale marked in golden Chinese characters. There are as many scales as there are string supports. The equal-arm scales are built similar to ours; they have the pointer playing upward, are nicely adjusted, and they keep the pans at rest by sliding a wooden block underneath them when not weighing.

Weights are made in two qualities: the common kind, used on the steelyard, are of iron, and are suspended therefrom by means of a string tied about the knob at the top of the cylindrical body. These weights are similar to our knob weights in form. The fine quality, used for weighing specie and drugs, are made of bronze. These are finely polished, similar to a figure 8 in form, only very slightly contracted in the centre; they are about as thick as they are broad.

As the standard of weight depends on the fact that the standard Chinese currency is silver, which is only worth its bullion value for all important commercial transactions, and, consequently, is weighed, and, as their weights have the same names as the divisions of the currency, I give a table of these coin values.

10 cash equal	1 candareen.
10 candareens equal	1 mace.
10 maces equal	1 tael.
12 taels equal	1 pound avoirdupois of silver.

So we see their standard coin is the tael, and this is their unit of weight. Weights of 10 taels down to the mace are made of bronze; the 1 mace and subdivisions thereof are made of small thin blocks of ivory. All weights have the imprint in Chinese, indicating their value.

The prices obtained by the druggist vary very much, a small pot of eye-paste to clear the vision brings about 6 cents; an ounce pill, gold coated and encased in wax, may bring several dollars, while the Chinese panacea, the native ginseng, brings its weight in gold.

It is the usual thing to find a physician, who has gained a reputation, in each drug store; he is not connected with the store management proper, but the druggist finds it to his trade interest to have a desk for the physician in his shop. The consultation is somewhat on this order: The patient comes, he is very carefully examined as to pulse both of the right hand and the left, this may take ten minutes, then follows a searching examination of the eyes, tongue, etc. A prescription is now written and the patient hands this to the druggist. It may call for a standard pill or a complex prescription of animal and vegetable drugs; all is carefully weighed out separately and wrapped up for the patient. At the home this is mixed according to the directions given, and an infusion thereof made. The druggist does not retain the prescription.

The Chinese materia medica is like that of the times of Lemery; the vegetable drugs are the most abundant; of course, there are also very many animal drugs of all kinds, while the inorganic chemicals and the fossil shells, animals and the like, are of least importance. There must be over a thousand drugs exhibited here. Many are in our own materia medica, such as rhubarb, valerian, veratrum nigrum, liquorice, several varieties of galls, safflower, melon seeds, blistering flies, calomel, alum, copperas, sugar, honey, wax, etc. We give a number of each kind of drugs and the uses to which they are put.

Drugs from plants are many, and the most important is ginseng. By Tong Shan we mean ginseng, the kind that grows in the northern and highly favored Chee-Lee province, and not the cheap American product known as Yeung Sum by the Chinese. The genuine ginseng is much larger and plumper than that grown in Kentucky; and no Chinaman that has the price would take the American product if he could get the Chee-Lee province brand. Tong Shan brings more than $100 a pound in China wholesale, and as it "allays excitement, increases secretions and the flow of saliva," it is certainly worth it. The American ginseng is also a "sialagogue, relieves thirst and is a cooling medicine," but it is worth only a little more than $5.00 a pound in Canton.

Tai Wong is rhubarb; it is used for jaundice, dropsy and dysentery.

Fu Pak or amber is specially indicated in cases of fright of children, and is used in nearly all remedies designed for child sickness.

Mut Yeuk is myrrh, it dissipates effused blood and cures pain.

Pung Lung Fa is the betel-nut flower; this is an expectorant and intestinal remedy.

The so-called lotus nuts are round brown-coated kernels with white meats, and nearly ¾ inch in diameter.

Beautiful thin white sheets of paper cut in squares about 3 inches across, as obtained from Aralia papyrifera, are shown.

What is the most striking in this exhibit are the many animal drugs; you feel as though you step into the past of our pharmacy; that you read from the pages of the old Pharmacopœia Augustana, with its many queer drugs and the interminable Theriacæ Andromachi, its Classes Mithridatii Damocratis, and its gems, fossils, snakes, etc., used at that time, only two centuries ago. The Chinese are fond of boiling things up with water, and they show many animal glues.

Cow glue and chicken-blood glue are used. Tiger-bone glue cures rheumatism, and was stated to do wonders by the European in charge. Tortoise-horn glue relieves heat of blood, dryness of the mouth and thirst. Luk Káu (also Lu Chiao), deer-horn glue, is a tonic, increases the semen.

Bones of the various animals are used. Sing Yuen, antelope horns, relieves the heart, liver and lungs. Sai Kok, hippopotamus horns, removes the impurities from the blood, abates the heat of the heart. Kuai Pan, tortoise shell, is a tonic for the blood of young people.

Of things that crawl and hop, I found: the Ki Li Kwai lizard (frog) was good for dysentery; Ki She, a snake, cures rheumatism in limbs and fingers; Kop Kai, lizard, is an aphrodisiac; Ti-lung, earthworm, regulates menstrual discharge and relieves colic. The bile of three kinds of snakes is an expectorant and carminative. I also saw Ch'an Su, or toad-spittle cakes; they exercise the toads, thereby obtaining the fluid that they are well known to discharge, this is dried and formed into cakes about 2 inches across and ¼ inch thick, the cakes are brown and have a white spot in the centre from manipulation. Two beautiful jars of dried frogs are shown. Some very fine centipedes, 4 inches long, of many joints, each joint having a pair of legs. The back of all joints, except the head and first joint, are black on the back, these are of a fine orange tint, likewise all the legs and the breast. If you examine the jar of scorpions you will distinguish their form as that given in many patent medicine calendars as part of the zodiac. These are not in as perfect a state of preservation as the centipedes; are rather deep brown in color, about 2 inches long and almost all legs.

There is nothing buggy about the Chinese, still you find many bugs shown as medicine; such are beetle skins, Ch'an Pui or cicada skins; Chin Chan Hua, locust-like bugs; tree bugs, like those flying about our electric lights; earth beetles, very much like the humble tumble bug; fine specimens of the Chinese blistering fly; a Hung Paw Mao bug from Tien-tsin; these are an inch in length, having a reddish breast and black back. What these bugs are used for I did not find out.

Feng-fang is a wasp's nest, a jar of fine quality is shown.

Fossilized remains of prehistoric animals are also shown. There is a jar of "fossil shells," they are trilobites; also some fossil crabs

in another jar. Dragon teeth and bones! Lung Nga is Chinese for dragon teeth; they "quiet the mind and heart, cure tumors in the neck of adults and fright in children."

The Chinese make some fine chemicals of apparently highest purity. White alum from Hankow is pure white in color and we could distinguish octahedral terminations. Vermillion from China has long been considered to be the best made, by painters; a fine jarful is exhibited. Calomel of good appearance also comes from Hankow. Sulphate of iron, also there called green alum, fills several jars from Siufu and Cheefoo.

Of minerals used in medicine I found iron pyrites and realgar, the latter, the red sulphide of arsenic.

CHINESE PHARMACEUTICALS.

Practically the only liquid preparations made are the infusions, and these are always made in the patient's home. Alcohol, vinegar, glycerine, ether and the like are not used in the native Chinese drug store as solvents. The only liquid preparations found are medicated oils. Ointments, pastes, pills galore, powders, simple and compound, are practically the only preparations made. They are highly advanced along patent medicine lines, fine advertisements extolling the peculiar virtues of preparations are gotten up.

Chinese pills are not like the nice little sugar-coated American product, but they stand in a class of their own. There is nothing small about these Chinese pills, they are great; not only are they elegant in appearance, but often of such generous proportions that they weigh an ounce. Fortunately for the Chinese, they do not swallow them whole, but cut them into as many pills as is desired by their physician. The Chinese pill is a bolus carefully rounded and of the usual consistency of a pill mass, the dearer pill is coated with gold leaf to preserve it, but, as even with such treatment the pills would harden, the Chinese druggist gets in his peculiar ingenuity and encases the entire pill in a beautiful wax coat. Such pills retain their original freshness for a great length of time. When you buy the pill at the druggist's he will remove this wax coat, then weigh the pill, and you pay accordingly. Some pills are sold by number, but the usual practice is the above. To give an idea as to their pills I copied the following in the exhibit:

"Seven Precious Ingredients Im-Tam Pill," a tonic for the Ming-Mun (small of back between kidneys).

"Hung Sing Cham Chung Pill," used for loss of memory from overstudy.

"Eight Genii Old Age Pills," a tonic for the promotion of long living.

"Aloes Pills" cure heat of lungs and colic pains.

"Triple Compound Tonic Pill" warms kidneys, aphrodisiac.

"King Pu Fu Tsim Pill," tonic for the legs.

"Fifteen Times Prepared Tsing Ning Pills" cure heat from damp, purgative.

"King Ngok Yan Kwai Pill," tonic for right kidney.

"Ginseng Tonic Pill," useful for debility, spleen and liver.

"Chi Pak Pat Mi Pill" will cure excess of venery.

"Hak Shik Pills," sulphur pills, fever.

Powders are also prepared and sold as such by our Celestial brother, and we may mention the "Voy Yeung Sz Yik Powder" that is used in general weakness. "Tit Ta San" (falling bruise powder) cures scalds, burns and wounds.

Charms are not foreign to Chinese practices, the "Ka Nam Pik Yik Heung Chu" is a renowned charm against epidemics, is made in strings of eighteen beads and worn on the left coat collar. This charm costs $2 per string of eighteen beads.

Ointments are made and sold by the druggists. The "Shea Heung Siu Leuk Ointment" cures scrofula, ulcers and swelling.

The making of infusions is the favorite mode of medication, undoubtedly the very general practice of tea-growing and drinking is cause for this popularity. In general all simples bought at the shops are made into infusion by the Chinese, even the ofttimes complex mixtures of the Chinese doctor's prescription, bought and weighed out separately by the druggist to the holder of the prescription, are taken home, mixed and infused for the patient. They have one that would undoubtedly be of great value in this country; it is the "Infallible Voi Tsun Tea" that cures indigestion.

Omega oil is not in it with the U-E-Yan (As you wish oil). This can be taken internally and also applied externally; it is a great seller in Canton, being an infallible oil for all diseases, headaches, etc. The Europeans take kindly to it.

I believe there is a golden medical discovery exploited in the United States, the large firm of Kwong Chi Koon has a seller in "Sing Po Golden Prescription" that is "useful in loss of voice and

injury of liver." This firm is located in Canton, and all the pills and preparations mentioned above, shown in this exhibit, are of their manufacture. About a hundred Chinese and Europeans find employment with this firm.

MANUFACTURES INVOLVING CHEMISTRY.

In southern China the buffalo is the beast of burden, in the north they have the horse. These animals are used in many oil mills to move the rollers. The wind is harnessed up in a peculiar manner; they make a large horizontal wheel, on the periphery masts are erected, from these large sails are hung. Such mills are especially used to hoist water. Coolie labor is cheap in the East, they use it in treadmills, carrying goods and the like.

Machinery is of secondary importance in China, still they have some crude appliances. Edge runners working in a groove propelled by the beasts of burden are used to crush oil-bearing seeds. These runners are not hung in pairs as is customary in our country, but only single; to the extension of the axle the animals are hitched.

Horizontal burr-stones are used in the manufacture of rice flour, grinding of seeds for making vegetable oil and tallow. The upper stone is movable, on the periphery a vertical axle is fixed, to this a long pole is attached, this is supported by a rope tied to the ceiling. The native pushes and pulls on this pole or crank. A hole in the stone permits the continual feeding of rice.

Tread-hammers are used in the compressing of vegetable tallow into firm cakes. These hammers are heavy affairs mounted on an axle near the operator; by alternately stepping on and off he raises the hammer and lets it drop.

For expression of oil enormous wedge-presses are used. These are horizontal, the crushed and warmed seeds are placed in circular iron hoops, a circular timber fits in the hoops, wedges are forced behind this piston. Huge mallets swung from the roof give the necessary power for this.

Heating is commonly done by direct firing of the tubs, pans, etc. The fuel almost exclusively used is straw and wood. Large furnaces are used in the manufacture of the celebrated "chinaware" or porcelain. Such furnaces are shown.

Filtering or straining is commonly accomplished by using the bibulous Chinese paper.

Lime burning is not done in kilns or shafts but upon platforms. These platforms are perforated metal sheets; separating this from the firepot is a brick wall. The fuel—straw and wood—is placed in a lower pit, the hot air is led up through the perforated platform; a pure grade of lime results.

The Chinese were the first to make porcelain. They made the so-called "chinaware" a thousand years before the Germans succeeded in stumbling upon the process. This is an enormous industry. In the Imperial Chinaware Works, at Kiu Kiang, there are over 3,000 kilns and a small army of workmen. It is at this place that the celebrated kaolin, also called mingsha, or china clay, is found. Beautiful snow white bricks of this kaolin are shown, as are also some thirty fine pigments used in the coloring of ware. A small model of the manufacturing plant is shown, and here is also seen the potter's wheel—the only machine that has not been improved upon for the last 4,000 years. The mixture used is kaolin and feldspar, the latter serving as a flux. Some very fine samples of finished ware are shown.

Salt is extracted from salt earth, or mud, obtained at the mud flats along the sea coast. This is heaped upon tubs, the bottom of which has filtering material, as bits of bamboo, and also a draw-off. Water thrown on this heap gradually trickles through, leaches out the salt and runs into a sunken tub. From this the brine is bailed out, placed in a large evaporating tub, fired from beneath, and evaporated down. The Chinese make salt of snowy whiteness. It is usually brought into trade rather coarse; also salt that is used for animals, of a white fracture, but rather black surface.

In dyeing they use hot dye baths, express the excess of liquor by rollers, hang the finished product on elevated bamboo poles in the yards.

Sesame oil, linseed oil—used as we do salad oil—walnut, teaberry, rapeseed, groundnut oil, wood oil and vegetable tallow are expressed. The most distinctive is the manufacture of the vegetable tallow. A vegetable tallow is made from the seeds of a castor-bean plant; but the finest is expressed from a kind of white, tallowy, stringy fungus that grows on certain trees. This fungus coats the limbs to about an inch in thickness. It is removed, first run through the edge runner mill, then ground finely in the burr stone, following which the comminuted mass is warmed over the fire; it is then packed in

the iron hoops very tightly and placed in the wedge-press. The liquid fat is caught, placed in molds and thoroughly pounded into shapes by the tread hammer. This vegetable tallow is very hard, and as the process is complicated and difficult, also as the great standard on oils (Lewkowitsch) does not mention this manner of obtaining the vegetable tallow, it is interesting; he mentions only the castor-bean product.

Swatow is the centre of sugar manufacture in the south. To express the cane, they have large upright revolving pillars; these are revolved; the force is supplied by buffaloes hitched to the end of a long timber working at the top of the pillars. A native feeds the stalks one at a time on one side; the juice exudes, runs into a sunken well, at the base of the rollers. The juice is carried into the evaporating-house in buckets; here, over the free fire, it is concentrated; naturally, the sugar so obtained is rather yellowish in color. Some samples that would here be called a rather poor grade of gray sugar are labeled white sugar.

It would not do to say nothing of the curse of China—the opium habit. In the Yunnan province, also in Sechuan province, in Southern China, opium is grown; this is near India. Samples of opium in little jars, as prepared for smoking, are shown; also some as sent into the drug trade. The latter is done up in rectangular parcels of brown paper, tied with hemp twines a number of times. The saloons of China are the opium houses; some streets have one of these on every corner; but this traffic is on the down road, as the government is gradually running these dealers out of China. It is only in those towns, such as the treaty ports of Southern China, that this practice is carried on to any great extent, and that mainly among the coolies.

PERIODICAL REVISION OF DISPENSING PHARMACIES.

By M. I. Wilbert,
Apothecary at the German Hospital, Philadelphia.

At the coming meeting of the American Pharmaceutical Association it is quite probable that the proposed "National Bureau of Medicines and Foods" will be brought forward once more for discussion, with a view of securing the endorsement of the association in favor of its proposed objects.

While there is much to be said in favor of such a bureau of control, it, of itself, would not, and, under the most ideal system of administration, could not control the efficiency and purity of medicines as dispensed to the sick and the ailing on physicians' prescriptions. It is quite probable that the members of the House of Delegates of the American Medical Association appreciated this fact, for, as is now well known, that august body, after considerable discussion, refused to concur in the recommendations of a special committee to endorse the inauguration and proposed objects of the "National Bureau of Medicines and Foods."

The objects of the proposed bureau, as enumerated in the report of the committee of the American Medical Association, are as follows:

(1) To relieve physicians, pharmacists and the public of all doubt as to the composition or standards of identity, purity, quality and strength of such drugs, medicines and foodstuffs as may be submitted to and be found acceptable by a competent board of ten experts.

(2) To furnish to physicians and pharmacists, and to others who may be interested, accurate and reliable information concerning articles submitted to the bureau for its supervision.

(3) To certify to the standards of identity, purity, quality and strength of such articles as may be determined to be worthy by the board of experts and of no others.

(4) To relieve the physicians, in the manner outlined, of the doubt and uncertainty as to the nature, composition or reliability of the medicines which they are requested by representatives of various houses to prescribe or to employ.

From this statement of the objects of the bureau, it will readily be seen that there is absolutely no provision for following up the various drugs and preparations that have received the endorsement of its board, nor is there any limitation as to where or how the various preparations are to be handled or dispensed.

As is well known, many drugs and chemicals, and nearly all galenic preparations, deteriorate on keeping. This deterioration is, perhaps, not so much due to the element of time alone as it is to general atmospheric conditions and the lack of technical knowledge or care in storing the various substances.

This question of drug deterioration, while it is a matter that is generally recognized, has received but comparatively little attention

in this country, and is usually lost sight of, particularly in discussions on the improvement of drugs and preparations.

In addition to drug deterioration, there are a number of other factors that should be taken into consideration in connection with the dispensing of medicines on physicians' prescriptions.

Among these we may cite the position and general condition of the dispensing department of the drug store ; the accuracy and also the sensitiveness of scales, weights and measures; the presence or absence of authoritative works and works of reference on the Materia Medica; the presence or absence of the necessary apparatus to properly test and identify the various drugs for which such tests are known ; and last, but not least, the nature and extent of the probity, technical knowledge, training and general ideals of the proprietor or manager of the pharmacy or store.

Any rational individual must admit that, no matter how excellent a material may be when it leaves the manufacturer, there are still numerous chances of its becoming worthless, if not positively dangerous, through carelessness or neglect, before it reaches the consumer.

It is for these reasons that the proposed "National Bureau of Medicines and Foods" cannot be considered far-reaching enough in its objects to benefit the physician and the pharmacist; but might, on the other hand, by giving a false sense of security, be positively harmful in its influence, by delaying, if not preventing, improvements along more desirable lines.

It would be reasonable to suppose that if, instead of one bureau more or less closely connected with manufacturers and wholesale dealers, we had a thousand independent investigators constantly on the lookout for materials that did not correspond to certain well-known requirements, that the consumer would be at least as well, if not better, protected from adulteration and fraud, and that, on the whole, he would be getting better service, and, at the same time, would be fostering a spirit of investigation in a more or less competitive way.

In this connection it may be said that it can hardly be supposed that we have arrived at that stage of our development when all scientific work can be entrusted to institutions especially devised for that particular field of investigation. There always have been, and there always will be, men who are especially gifted in certain direc-

tions; but it is folly to assert that it is possible to institute a certain line of work and to constantly have at hand men who are experts in that particular field for the asking.

If we, in this country, desire to make rational progress in the field of medicine, we must endeavor to keep the practice of medicine, and all that pertains to it, free from any possible taint of commercialism, and at the same time endeavor to build up, in all the branches of medicine, a spirit of rivalry for honest scientific investigation and work that will produce exceptional men for the exceptional cases and places as they occur.

In the field of pharmacy this may perhaps best be done by promoting a line of dispensing pharmacies that are independent of and free from the spirit of commercialism to which so much exception is being taken at the present time.

For this purpose an innovation that would be of advantage, particularly to such pharmacists as are willing to conduct their shops along professional lines, would be to institute a periodic and systematic revision or inspection of dispensing pharmacies, very much the same as is done in some of the European countries, particularly in Germany, at the present time. Such an inspection could be made in a number of ways—it might be entrusted to a state or to a local board of pharmacists—or, and this I believe to be the more rational scheme, it might be entrusted to a committee composed of physicians and pharmacists under the authority of the local county medical societies.

To prevent any suspicion of this idea being original with me, I should like to state that some eighty-three years ago, when the Philadelphia College of Pharmacy was founded, the apothecaries and druggists of the city of Philadelphia and the surrounding districts resolved, or rather proposed, "that the whole profession should form themselves into a society for the twofold purpose of providing a system of instruction for their apprentices and subjecting themselves to regulations in their business."

It appears that the latter portion of this proposal was allowed to lapse, largely, perhaps, due to the fact that at that time there were comparatively few dispensing drug stores in the city, and that the system of regulation, or inspection, as was then proposed, met with considerable opposition on the part of druggists whose business was largely devoted to the sale of paints, glass and dyestuffs. The

proposition was not lost sight of, however, and was brought up, from time to time, by the more advanced and progressive pharmacists who were members of the college.

Among these, Daniel B. Smith, who was the third president of the Philadelphia College of Pharmacy, was a warm advocate of professional pharmacy, and also of systematic inspection of the several stores. In an address, delivered to the first class to receive the degree of Ph.G. (A. J. P., vol. 1, page 243), in referring to the needs and wants of pharmacists, he said: "Before we can assume to compete with kindred institutions of the Old World, our system of scientific instruction must be extended to other branches of natural history, and rendered more thorough and minute in those which are already taught. Our members must be willing to subject the contents of their shops to periodical scrutiny by impartial and competent judges. The College must exercise a vigilant police over the market for drugs, and over the weights and measures used in the administration of medicines."

While it is true that none of the colleges of pharmacy in this country have ever essayed to comply with the high standard of excellence outlined by Daniel B. Smith, in his address, they did, during the first decades of their existence, contribute materially to improve the quality of the drugs and medicines sold in the cities along the Atlantic Coast.

As is well known, it was not until 1848 that Congress passed a law, which is still in operation, to prevent the importation of grossly adulterated or sophisticated drugs and medicines.

Much of the credit for bringing about this desirable piece of legislation is due to the then newly-organized American Medical Association. This association at its first annual meeting, in Baltimore, 1848, had presented to it a lengthy report on "The adulteration of drugs and medicines," and in turn adopted a spirited set of resolutions which were addressed as a memorial "To the Honorable Senate and House of Representatives, in Congress assembled," endorsing the bill which was then pending, to exclude fraudulent drugs and medicines from this country.

In the years immediately succeeding, reports on the adulterations of drugs and medicines were made an annual feature of the Association's work. These reports, at the present time, constitute a veritable mine of information as to the practices of unscrupulous dealers

at that time, and also indicate the marked improvement that has taken place in the quality of drugs and medicines.

From the recommendations that were attached to these several reports, I should like to quote from the report by Dr. Robert M. Huston, of Philadelphia, published in 1850 (*Proc. Am. Med. Assoc.*, vol. 3). "It is to the members of our own profession, in conjunction with the respectable druggists and apothecaries, that we must look for whatever reformation is to be accomplished.

"It has been suggested that physicians should feel it to be their duty to inspect the medicines in the drug stores from which they are in the habit of obtaining their supplies, for themselves or their patients. This would exercise a wholesome influence if submitted to by the apothecary and frequently performed by the physician."

It is this same proposition, that was thought to be impracticable half a century ago, that I believe could be put into operation at the present time, with advantage to the members of the medical as well as pharmaceutical professions.

Such a system of inspection might readily be inaugurated in connection with the work of local or county medical societies and might be made one of the requisites for pharmaceutical membership of the American Medical Association.

The local medical society could in this way control, not alone the class of drugs and medicines, but also the nature and kind of store at which it would recommend the prescriptions of its several members to be compounded. In larger cities particularly such an arrangement would be of inestimable value to the physician, as it would relieve him of any possible suspicion of favoring any one pharmacist, and at the same time give him a reasonable assurance that his prescriptions would be compounded, at any one of the recommended pharmacies, by competent men and in the best possible manner.

It is true that the requirements, at least at the start, should not be prohibitive, but they can readily be made to cover a wide field and can be made more stringent as occasion permits.

Among the factors that might be considered in this direction are:

(1) The number of stores to be recommended.

(2) The arrangement and general contents of the store.

(3) The class of analytical and manufacturing work that should be done in connection with the dispensing department.

(4) The nature and quality of the goods that are allowed to be carried as a side line.

(5) The ability, training and achievements of the proprietor or manager.

The practical application of the scheme could be made simple enough. A pharmacist who wishes to have the endorsement of the local medical society would obligate himself to conduct his pharmacy strictly in accordance with the requirements of his local society, which in turn would be subject to change and strictly in keeping with the ideas and ideals of the members of the society. The pharmacist would be subject to periodical inspections by a special committee, appointed for this purpose, and would also be subject to complaints for any violations of the stated requirements by any one of the members of the society.

The requirements made by the local societies might be controlled, in a general way, by the state or national associations so that there could be absolutely no cause for any suspicion of favoritism. A proposition of this kind, put into operation, would assure for the pharmacist who is anxious and willing to do conscientious work, the endorsement and encouragement of the better class of physicians of his city or town.

It would ensure for the physician a source of supplies that is absolutely under his control, at least so far as the excellence or the quality of the various drugs and preparations is concerned, and would at the same time relieve him of any suspicion of being interested in the shop of any one apothecary; for he would have several to choose from whose honesty and ability are subject to his censure or control. For the public such an arrangement would be of inestimable value in that it would make a distinction between the efforts of the honest, earnest and able man who is in the practice of pharmacy with a view of improving or increasing the sum total of human knowledge, as being distinctly above the ideals of the man who is willing to pose as a vendor of patent medicines and adulterated drugs, whose sole object in life appears to be to sell anything and everything, regardless of the consequences, simply and solely for the profit that accrues to him for the time being.

This latter suggests, too, what I believe to be the strongest argument in favor of some arrangement similar to that proposed above. If the dispensing of legitimate prescriptions were absolutely divorced

from the promiscuous sale of medicines and appliances, that are openly and willingly recommended and sold for questionable or even criminal purposes, physicians and pharmacists who are not willing to endorse such practices would not, as at present, be suspected of sanctioning the same by fraternizing with or patronizing the proprietors of establishments where the same are sold.

THE EDUCATIONAL QUALIFICATION.[1]

BY ALBERT B. PRESCOTT.

The public-school system is the heart of intellectual life at the present day. The school system cannot be considered separately from the organization of the commonwealth. The pulse of the school beats through the community, and beats by virtue of the vital force it draws from that community. To complain of the schools is to be impatient with the development of the people and with the present stage of civilization.

The people have entered upon a new order of living whereby city and country are consolidated. The farmer, receiving daily papers by rural free delivery, takes two postal cards that he may stop the one paper and start another of a different political utterance, with as much independence as he could exercise were he a candidate for the Governor's chair. He can call his family physician by telephone, or call up his druggist for further directions in the relief of a crop from the ravages of a destroying insect. The mechanic or the frugal laborer counts on the schooling of his children as he counts on the roof over their home, and watches the test of his sons in the high school as their capabilities are weighed in the common intellectual balance, under plans for the business of life and for its several pursuits.

The people themselves are adopting by a township vote the provision of centralized schools, having all high-school grades, with free transportation of all pupils to and from their rural homes. The conveyance of school children is guarded by State contract as sacredly as the carriage of the mails under contract of the Federal

[1] A paper read before the Michigan State Pharmaceutical Association at the Grand Rapids Meeting, August 10, 1904.

Government. In Michigan the representative of the State Grange unites with the Superintendent of Public Instruction in a report upon the Centralized Schools of Ohio, looking to it that our State shall not fall behind in the march.

Such are the people of this Commonwealth, whose sons and daughters carry the numbers of high-school students, and lead in the intellectual sentiment of high-school classes. Already in the high-school grades they nourish the pride of liberal learning, they yield to the ambition for such a general training in the science and literature of the world's work and thought of to-day, as shall give them strength in any pursuit they may enter upon—advantage in any station they may fill.

It always seems to me, in the self-confidence of my own enthusiasm, that I could appeal to high-school seniors, in behalf of pharmacy, as a pursuit of interest and promise, a study that brings the potent materials of all the earth to the foot of man, an opportunity to draw the inventions of science into the profits of a manageable business. In the simplicity of my heart, I would like to lay the actual merits of pharmacy before a large jury of high-school graduates, many of whom are certainly wanted in pharmacy. Certainly, I say, there are places waiting for them, these young men whom I seem to see before me, the students who have won out in the four-years' race of the general studies of the high school, if I as a stranger could get their attention to the real merits of pharmacy as a pursuit.

But these students, whom we are supposed to address, look one to another, and fall back upon what has happened among their former classmates, in the events known to their parents, and well known in the neighborhood at home. Fellows whom they know went before the State board after working in a drug store, and were given State examination in this same pharmacy. Fellows who couldn't pass to the third year of the high school went before the State board. Tom Jones, poor boy, never had a chance to finish the eighth grade, but he has taken the board examination in pharmacy, and the drug-store man thinks he can pass it next time. Yes, they have a State law, and a standard of knowledge and so forth, all going to show that high-school work is not in it. If they want high-school work why don't they stand up for it? I would rather go into a hardware store, where they don't set up for any studies in particular, than to go in on the grammar-school grade. This is

what they say to themselves, to each other, and to their parents, about pharmacy.

It is against such discouragements of low standards, and by virtue of the innate merits of pharmacy itself, that a good number of students of full college preparation still enter upon thorough courses of pharmaceutical study in university schools.

When I received the circular letter of Dean Searby, of the University of California School of Pharmacy, a few weeks ago, I confess to having felt some humiliation, that he should ask the Conference of Colleges to do no more than this, to require for college entrance one high-school year in 1905–6, two high-school years in 1906–7, and so on. But upon reflection I agree with him and with others, that *any standard in general education, providing an annual advance leading up to the equivalent of high-school graduation, faithfully adopted, deserves to be supported.* To begin with, it publishes the poverty of pharmaceutical education, and opens out the danger of neglect. Let us not shrink from open confession. Evils must be seen and declared. It is not too late to begin. New York is a little in advance of Michigan in the date prefixed for the high-school requirement. In their college standards, however, the exclusive policy of eastern States is by no means to be coveted by Michigan. For the pharmacy board to require the diploma of colleges up to this time wholly destitute of an entrance standard would never be a matter of pride in this State. We have set a better example for fully twenty years. To this the hundreds of New York and Pennsylvania graduates of the Michigan University bear witness, as do the students of pharmacy who continue to come to Ann Arbor from the eastern States.

At present, however, I fully believe that the immediate future of pharmacy depends mainly upon the general education; that is to say, the personal quality of its recruits. Young men of real ability and ambition, those who can adapt themselves to the shifting demands of pharmaceutical business and to its fast coming discoveries, are the men *to save pharmacy* as a distinct pursuit. Pharmacy itself will educate such men. No other profession does more to educate and develop its practitioners—those capable of meeting the opportunities of the time.

As a merely mercantile pursuit, it is hardly probable that pharmacy could maintain a separate existence very long, certainly not

with regulation by State law, nor with a body of practitioners recruited from the culls left behind by the public-school system.

Education, in its fullest meaning, has been well said to lie "in the great stock of ideas possessed by mankind." Shall we have a generation of pharmacists with the capacity of *continued* education in the commerce and the research of this avocation?

It is easy to agree with Dr. Henry E. Armstrong, of London, as chairman of the Mosley Commission, in his late report upon the educational methods of the United States, that over-teaching is the tendency in certain of the more advanced professional schools, as those of medicine and law at the present. Pharmacy surely cannot be charged with this excess, and the active commercial spirit of its practice will preserve it within healthful limits. It only remains to look to the personal quality of the recruits to its ranks to make pharmacy a most representative profession in the twentieth century.

A PREREQUISITE LAW.[1]

By Joseph P. Remington.

"Is it not time that graduation from a college of pharmacy be required before registration?"

The Committee on Papers and Queries having assigned to the writer the above question, to answer becomes a duty which is accepted cheerfully. It is recognized by not only the leaders, but the rank and file, that the time has come to demand a law which will compel graduation from a recognized college of pharmacy before a license will be granted to a pharmacist applying for examination for the highest grade certificate from the State Board.

This is not a new subject, for it was bruited at the very infancy of pharmaceutical legislation in this country; but the opposition of a number of druggists in business, who were not graduates from any college, halted the movement. They seemed to be possessed with the false and selfish idea that to protect their own standing they were compelled to belittle pharmaceutical education and decry its merits; but "Truth crushed to earth will rise again." As the

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[1] Read at the twenty-seventh annual meeting of the Pennsylvania Pharmaceutical Association, June 21–23, 1904.

country has developed, and it has been fully realized that education rules the Republic, active opposition has almost entirely ceased. Our pharmacy laws, which were at first administered with the greatest leniency, have grown to be serviceable as a protection to the public against incompetency, through the examinations, which have grown in length and stringency, until now it is an exception to the rule to find a majority of the applicants passing the examinations.

With experience has come deeper knowledge. At last, but few men will be found who will say truthfully that they believe that a college education is of no value to a drug clerk. The colleges of pharmacy have had a long struggle, but have persistently held to their course, and the tardy recognition which now seems to be in sight has been won through honest, earnest labor.

The pharmacist must be a professional man as well as a business man. The commercial side of pharmacy has been enormously advanced within the past few years through the organized effort of able leaders. This improvement was badly needed. The retail druggist, a few years ago, was at the mercy of any combination of men vastly his inferiors in intellectual attainments. The pharmacists of to-day are respected because they have shown manliness, and above all, a power of cohesion and ability to stand together which has surprised the business world. Ten years ago pettiness, distrust, jealousy and ignorance of business principles were the rule. Forced, at last, almost into bankruptcy by organized bodies who reaped advantage from the lack of the business abilities of the retail druggists, the latter, roused from their comatose and terror-stricken condition, at once buckled on their armor, and, led by able commanders, soon demonstrated that they were men, and it only remains for them to heed wise counsels and march forward to continued victories.

But while this has been going on, the professional side has been neglected, or it would probably be best to say, crowded out by the immediate necessities of the commercial renaissance, and the author of the above query was evidently conscious of these facts, for it begins, "*Is it not time* that graduation from a college, etc." It is a grievous mistake to believe that the professional side of pharmacy is antagonistic to the commercial side. One supplements and helps the other. A professional pharmacist who neglects commercial training runs the risk of having no opportunity of practicing phar-

macy at all, for he fails to realize a financial return for his long and weary hours of study, even if he escapes starvation, and he who cares for pharmacy *only* as a means of livelihood and derides the advantages of education, may succeed for a time, but he soon realizes that he must employ men who have this knowledge, to enable him to keep pace with the march of progress, and with this handicap almost any other business would yield him larger returns.

The emigrant who arrives upon our shores without money, with nothing but a good constitution, appetite and the ability to work with his hands, no sooner settles himself in some part of this country before the truth is forced home to him that, while it is too late for him to acquire an education, his children must have this boon, and he slaves from morning until night to educate his family, and who has not seen the pride and joy in the face of such a father at the time of the graduation of one of his children from school? There is no feeling of jealousy in his heart. He frankly says: "My boys shall do better than I have done." Why is it not possible for the old-time druggist to look upon his children and adopted children—the boys in the store—in the same light, and say: "I did not have the advantage of a college education, but I am going to help the young fellows to the best of my ability to get what I was unable to have myself?" Thousands have done this in the past, and tens of thousands are doing this now. Let us all hope that it will be a short time before all will range themselves on the side of education and progress. This is the spirit which has put this country in the foremost rank among nations; the next generation must prove superior to the present, or decadence and loss must follow.

But the present condition of pharmacy in this State is deplorable. It is possible for a young man with superficial ideas and unambitious instincts to enter a store, serve the necessary time and satisfy his employer by attending to his routine duties; but later he wakes up suddenly to the fact that he is getting along in years, that the time has come when he must have his own store, and then he thinks of the pharmacy law of the State, and says: "I must have that certificate." If he is far-sighted and well-advised, he will see at once that by far the cheapest and best course in the long run is to go to college, and by study and systematic training with a graded course of instruction, reach, in a short time, results which it would otherwise have taken him a life-time to have gained, for the simple rea-

son that the knowledge which comes in the fragmentary, hit-or-miss way, through working in a store, requires the expenditure of so much more time, and is so imperfect and full of gaps that it is folly for a young man to attempt to compete to-day with the college graduate, who, in addition to his education, has the practical experience in a drug store. Here and there it is possible to find a young man of exceptional ability, who has brains, health and ambition, who can acquire an education by the aid of books. Elihu Burritts are still to be found, but they are the great exceptions, and the only excuse possible for any one failing to take advantage of the easy and systematic method of acquiring an education by going to college is the absence of the necessary money to carry him through.

It must not be supposed that every man who attends college is necessarily better than every other man who has not had this advantage. There are those within college who have money and who waste their opportunities. Education is sometimes possessed by those who have a modicum of brains; but given brains, education and ability, and "in the bright lexicon of youth there is no such word as fail." But this proposition may be safely stated without fear of contradiction—it is impossible for any one to attend a college of pharmacy without acquiring some knowledge. He is much better off from having learned something than he who has the same ability and stays out. Our pharmacy laws have accomplished great results, but they are defective from the fact that an examination is made the sole test of one's ability. A young man comes up before a State Board and passes a few hours in the examination-room, and if he is lucky enough to have the questions suit him, he passes with flying colors, and that man goes forth deceived by the belief that he is henceforth equipped for the duties of his position. Throwing his books away, he plunges into business, and chuckles over the fact that he must be smarter than many college boys who have had to spend money at a college, and both have been handed the same kind of a certificate, for the examination has been the sole test of merit.

And still this is not intended as a criticism upon the work of the State Boards, for they have no other course to pursue under our present laws. They must depend upon examinations, and a wise step has been taken in this State by increasing the length of these examinations and requiring a practical examination with the mortar

and pestle, the pill tile and the spatula, to determine the fitness of an applicant.

In a good college of pharmacy the fierce ordeal of a final examination could be dispensed with. A good corps of instructors, whose duty it is to quiz every student in each course three times a week, can form a vastly better idea of the capacity of a student than can the most rigid examination at the end of the course. The only purpose that a final examination serves at the present time, where these conditions prevail, is to act as a stimulant to continued effort on the part of the student to keep up with his work. But, above all, in a graduated course of instruction, it is the systematic building up of an education that counts. It is an interesting spectacle to witness the process of acquiring a pharmaceutical education. When the student first comes to college, fresh from his home, he is in the raw, green, undeveloped state so often caricatured in our newspapers and magazines. Confident though ignorant, assertive yet deficient, it takes usually a year to destroy his conceit, and nothing brings him more quickly to realize his deficiencies than the continual daily prodding with questions on the lectures to which he has listened. Any one who has had experience with college students recognizes the quick, confident, elastic step on the stairway, of the first-year student as he marches into the examination-room for his first trial. How different is the step of the senior student, as he comes in with a worried look upon his face and a feeling that he does not know whether he will just get through or fail utterly. The first-year student has the spirit of the store or school from which he has come; he is confident of his ability to answer any question that is put to him, for has he not been looked up to with mystery and awe by the other boys of his town or village?

Cowper has written:

> "Knowledge and wisdom, far from being one,
> Have ofttimes no connection."

And although there may be fine material upon which to build, the boy, through his environment, has been deceived, for he soon finds that his knowledge is not of the vital, substantial kind. A young man gains, therefore, by going to college through learning how *little he knows*, for this is the first step toward real wisdom.

In looking backward for twenty years, we must all realize that thousands of young men have been given certificates of competency

by our State Boards, who were led, through passing an examination lasting two hours, into the belief that they were thoroughly equipped for their life's work. In the professions of medicine and dentistry, the laws of the State require, as a prerequisite to State examination, the possession of a diploma from a recognized institution. Why should pharmacy, having vastly more responsibilities to the public than dentistry, and in some cases even medicine, hold back from requiring the same prerequisite? As has been often said, the issues of life are in the hands of the pharmacist, and why should the Pennsylvania Pharmaceutical Association, composed as it is of the best of the profession in the State, not reach forward from this time and advocate, in season and out of season, a prerequisite law?

A resolution is on our minute books, passed many years ago, committing this Association to this prerequisite. The American Pharmaceutical Association is also on record, having passed a resolution at the Baltimore meeting, favoring a prerequisite law. Our sister State of New York passed last year a law requiring the possession of a college diploma before entering the examination-room of the State Board. A bill was introduced two years ago into our Legislature demanding this requirement; it failed to pass. With proper effort there should be no doubt of the passage of a good law for this State during the coming winter. Such a law should place the responsibility of determining the qualification of colleges to educate upon the Board of Pharmacy, and then demand that each applicant for the certificate of Registered Pharmacist should first produce his diploma before being allowed to take his examination for the license.

THE ANATOMY OF EDIBLE BERRIES.[1]

By A. L. Winton.

For the purpose of facilitating the microscopic examination of preserves, jams, etc., during the year 1901 and the early part of 1902, I made a study of the microscopic structure of a number of fruits grown in the United States, some of which are descendants of European species, others of species indigenous to America, and

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[1] This paper was printed in *Ztschr. f. Unters. d. Nahr. u. Genussm.*, 1902, 5, 785-814, and is reprinted from Connecticut Expt. Sta. Report, 1902, p. 288.

during the spring of 1902, while at the University of Graz, Austria, at the suggestion of Professor Moeller, I extended the investigation as to embrace the allied fruits grown only in Europe.

Twelve were investigated in America, as follows:

The cultivated strawberry (*Fragaria Chiloënsis* Ehrh.).

The American field strawberry (*F. Virginiana* Duchesne).

The American red raspberry (*Rubus strigosus* Michx.).

The black raspberry (*R. occidentalis* L.).

The blackberry (*R. nigrobaccus* var. *sativus* Bailey).

The dewberry (*R. villosus* Ait.).

The red currant (*Ribes rubrum* L.).

The black currant (*R. nigrum* L.).

The American gooseberry (*R. oxyacanthoides* L.).

The European gooseberry (*R. Grossularia* L.).

The American cranberry (*Vaccinium macrocarpon* Ait.).

The huckleberry (*Gaylussacia resinosa* Torr. and Gray).

Three were studied in Austria, as follows:

The forest strawberry (*Fragaria vesca* L.).

The European raspberry (*Rubus Idaeus* L.)

The mountain cranberry (*Vaccinium Vitis Idaea* L.).

Although the primary object of this work was to secure data for use in the detection of inferior fruits, foreign seeds and other adulterants in fruit products, other points of scientific interest have not been overlooked.

The writer desires to express his gratitude to Prof. Dr. Josef Moeller, Director of the Pharmacological Institute, Graz University, for kindly advice and criticism; also to Mr. W. E. Britton for aid in tracing the origin of American fruits. The cuts were reproduced from the author's drawings by F. X. Matolony, of Vienna.

THE STRAWBERRY.

The varieties of strawberry cultivated in Europe are chiefly improved forms of *F. Chiloënsis* Ehrh., but some are said to be hybrids of this species with *F. vesca* L. or *F. Virginiana* Duchesne. In many parts of Europe, however, the small but delicious wood strawberry (*F. vesca* L.) is consumed in larger quantities, both fresh and preserved, than the cultivated sorts.

Bailey[1] classifies the strawberries of North America in three

[1] The Evolution of our Native Fruits. London, 1898, pp. 428–432.

groups: (1) the Virginian group, including *F. Virginiana*, the common field and meadow strawberry of the Eastern States, with its varieties; (2) the vesca group, including the Old World strawberry and the American form, called by Porter *F. Americana;* (3) the Chilian group, to which belongs the Chilian species with all its cultivated varieties, and the North American species, native of the Pacific Coast, with its varieties.

In Colonial times the wild, or Virginian, strawberry, with its several varieties, was cultivated in American gardens, but of late years has been supplanted almost entirely by the numerous derivatives of the Chilian species, although wild strawberries are still gathered in considerable quantities in the meadows. *F. vesca* grows in the northern part of the United States, but is not so common as the Virginian species.

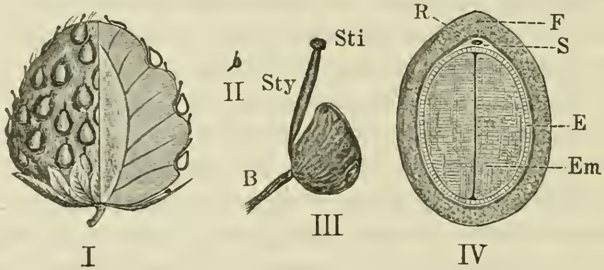

FIG. 1.—Strawberry. I Compound fruit, × 2. II Achene, × 1. III Achene, × 8. Sty, style; Sti, stigma; B, connecting bundle. IV Achene in transverse section, × 32. F, pericarp; S, testa; R, raphe; E, endosperm; Em, embryo.

Macroscopic Structure.—The cultivated strawberries (*F. Chiloënsis*) are usually of large size (often 3 to 5 centimeters in diameter), and bear the achenes in deep depressions.

Berries of the wood species (*F. vesca*) are of small size (seldom over 1 centimeter in diameter), and bear the achenes in shallow depressions.

Berries of the Virginian species are of about the same size as the wood strawberries; but like the cultivated berries, the achenes are deeply sunken in the receptacle.

The receptacle, the edible part of the strawberry, consists of a somewhat fleshy pith, a still more fleshy cortex, and between the two a narrow zone of fibro-vascular bundles, from which branches shoot off through the cortex to the achenes. (*Fig. 1*, I.)

On the surface, the receptacle has a tufted appearance, due to the somewhat regularly arranged depressions occupied by the achenes. The epidermis is sparingly pubescent.

The achenes are ovate, pointed, about 1 millimeter long (*Fig. 1*, II and III). Each is attached to the receptacle a little above its base, and contains a single anatropous seed, which is described as "exalbuminous," since the endosperm is not evident under the simple lens. The style (about 2 millimeters long) arises from the ventral side a little above the point of attachment.

The pericarp is hard and comparatively thick; the testa soft and thin; the embryo minute (*Fig. 1*, IV). When the fruit reaches maturity the calyx is still green and leaf-like, and the stamens are

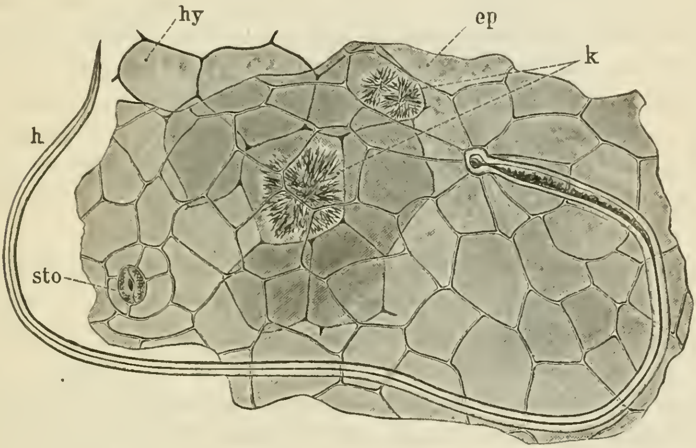

FIG. 2.—Strawberry receptacle in surface view. Ep, epidermis with h, hair and sto, stoma; hy, hypoderm; k, klucoside (?) crystals. × 160.

also well preserved. The calyx, the stamens and a portion of the pith are removed in preparing the fruit for the table.

Histology.—Kraus,[1] in 1866, noted the general microscopic structure of the pericarp, and Tschierske,[2] in 1886, made an exhaustive study of the structure and development of the pericarp, endosperm, receptacle and style. Neither author describes the structure of the testa. Blyth[3] gives the shape and dimensions of the achenes and

[1] Ueber den Bau trockner Pericarpien. Pringsheim Jahrbücher, 5, 83–126.

[2] Beiträge zur vegleichenden Anatomie und Entwicklungsgeschichte einiger Dryadeenfrüchte. Ztschr. f. Naturwissenschaft, 59, 594–600.

[3] Foods: Their Composition and Analysis, London, 1896, 161.

refers briefly to the histology of some of the tissues found in jam, but does not mention the styles and hairs, which are the elements of chief importance in diagnosis. Marpmann[1] describes some of the seed tissues and gives a cut illustrating their appearance in surface view.

In microscopic structure the cultivated, the wood and the Virginian strawberries are identical.

Receptacle.—(1) The Epidermal Cells (*Fig. 2*, ep) for the most part are polygonal and isodiametric, but those radiating from the base of each hair are usually irregularly diamond shape, and often are strongly elongated. The hairs are not numerous, but are often over a millimeter long, tapering gradually from the widest part near the base to the point (*Fig. 2*, h). In the basal portion the lumen is several times the thickness of the walls, but narrows somewhat abruptly further on, and for fully three-fourths of the total length of the hair is but a narrow channel hardly one-quarter as wide as the walls. The walls, on the other hand, are narrowest at the basal end. Tschierske states that stomata are entirely wanting, but the writer has found them in all the specimens of *F. Chiloënsis* and *F. Virginiana* which he has examined.

(2) Hypoderm or Sarkogen Layer (*Fig. 2*, hy).—Tschierske has shown that the fleshy receptacle of the strawberry owes its origin to a hypodermal layer of meristematic cells, which are mostly tangentially elongated, and are always without intercellular spaces. These cells, to which he gives the name "sarkogen layer," resemble the phellogen or cork-forming cells of other plants, but differ in that the new cells are formed centripetally, and remain active during the whole period of growth; whereas the cork cells are formed centrifugally, and die soon after formation. The cells increase in size in radial directions, and divide by tangential partitions. After they have performed their mission, they continue to increase in size, but hold to their original shape.

(3) Cortical Tissue.—The daughter cells formed by the division of the cells of the sarkogen layer increase rapidly in size, become round in shape, and form intercellular spaces. This tissue forms the bulk of the ripe fruit. Each cell is rich in contents, which, on cooking or treatment with alcohol, yields a shriveled, opaque mass.

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[1] Ztschr. f. angew. Mikroskopie, 1896, 2, 97.

(4) Bundles.—Spiral and annular vessels from 0·005 to 0·010 millimeter in diameter, and thin-walled, elongated cells, are the conspicuous elements of the bundles.

(5) Pith.—Large berries often contain large intercellular spaces or cavities in the pith, formed by the tearing asunder of the cells during the rapid growth.

Pericarp.—(1) Epicarp (*Fig. 3*, epi)—Seen in surface view, the cells are polygonal, 0·015 to 0·05 millimeter in diameter, with thin walls; but in transverse or longitudinal section, they are rectangular and about 0·02 millimeters thick. The cuticle is several times as thick as the radial walls of the cells.

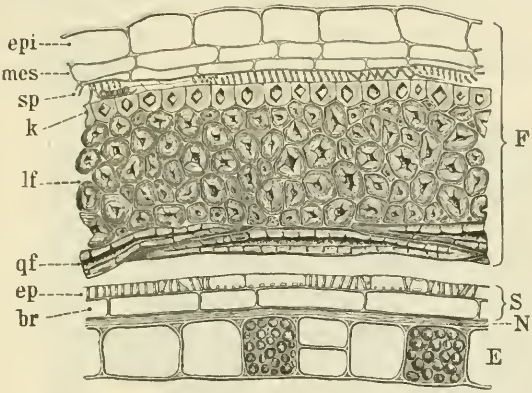

FIG. 3.—Strawberry achene in transverse section. F, pericarp consisting of epi, epicarp, mes, mesocarp, sp, spiral vessels, k, crystal layer, lf, outer endocarp with longitudinally extended fibres, and qf, inner endocarp with transversely extended fibres; S, testa consisting of ep, epidermis with reticulated cells, br, elongated brown cells; N, hyaline layer (nucellus); E, endosperm consisting of a single layer of aleurone cells. × 300.

(2) Mesocarp (*Fig. 3*, mes). This layer is strikingly different from the mesocarp of most edible fruits in that it is not succulent, and consists of only one, or in some parts two, cell layers. In cross section the cells have much the same appearance as the epidermis cells, but usually have smaller dimensions. On the inner side are numerous bundles, the branches of which run transversely about the achene.

(3) Crystal Layer (*Fig. 3*, k).—Kraus described this layer as made up of two cell layers; Tschierske, however, pointed out that it is in most cases made up of but one. The cells are polygonal isodiametric,

from 0·008 to 0·020 millimeter in diameter. The monoclinic crystals are always simple, and are especially striking when illuminated with polarized light. The diameter of each crystal is about half that of the cell in which it is contained.

(4) Outer Endocarp (*Fig. 3*, lf).—This layer, forming the larger part of the pericarp, is made up of five or more thicknesses of sclerenchymatous fibers longitudinally arranged. As seen in cross section, the cell walls are about as thick as the diameter of the lumen. The pores are clearly evident in longitudinal section.

(5) The Inner Endocarp (*Fig. 3*, qf) consists of the same elements as the outer endocarp, but is only one or two cell layers thick, and the cells are arranged transversely. On the dorsal side some of the fibers of this layer extend radially through the outer endocarp, thus facilitating the rupture of the pericarp during sprouting.

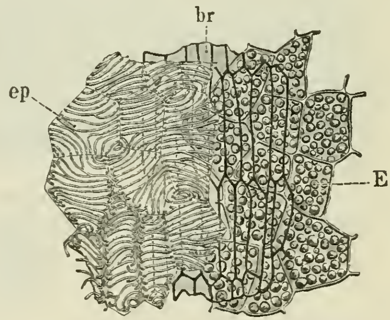

FIG. 4.—Strawberry testa and endosperm in surface view. Signification of letters same as in Fig. 3. × 300.

Testa.—(1) The Epidermis (*Figs. 3* and *4*, ep) is made up of thin-walled cells, which in surface view are polygonal, in section quadrilateral. The cell walls are exceedingly thin, but are strengthened by thickened bands, resembling those of spiral and recticulated vessels. They differ, however, from the latter in that they do not pass completely around the cell, but are wanting on the outer surface, so that in mounting a preparation the outer wall often collapses and the side walls fall down, presenting the appearance shown in *Fig. 4*. This layer is difficult to make out in cross section, but is readily studied in surface view.

(2) Brown Layer (*Figs. 3* and *4*, br).—The second layer of the testa is composed of elongated brown cells, which pass transversely about the seed. Transverse sections of these cells are quadrilateral,

with radial walls about 0·006 millimeter long. As seen in surface view, they are pointed, and often are arranged side by side in rows. They vary up to 0·10 millimeter in length, and usually between 0·010 and 0·015 millimeter in width.

Nucellar Layer (*Fig. 3*, N).—This coat consists for the most part of obliterated cells, forming a cellulose layer from 0·002 to 0·004 millimeters thick, but on the ventral side the cells are often well defined.

Endosperm (*Figs. 3* and *4*, E).—Transverse sections show that the endosperm is but one cell thick, although here and there a cell is divided by a tangential partition, forming twin cells. Seen in surface

FIG. 5.—Strawberry style and stigma. × 32.

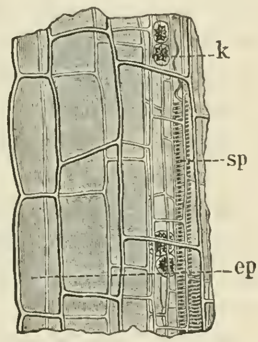

FIG. 6.—Strawberry style in surface view. ep, transparent epidermis; sp, spiral vessels; k, crystal cells. × 300.

view the cells are triangular, square or polygonal. In glycerine mounts of fresh or alcoholic materials irregularly spherical aleurone grains are evident. In nearly every point these cells resemble the aleurone layer of the cereal grains.

Embryo.—Two large cotyledons, each in cross section semi-elliptical, make up the bulk of the embryo. They are built up of thin-walled cells, much the same as in the cotyledons of many other seeds, and contain protein and fat, but no starch.

Style and Stigma (*Figs. 5* and *6*).—The strawberry style is distinguished from the styles of other edible rosaceous fruits by its constricted base and the large size and transparency of the epidermal

cells. The styles are about 0·3 millimeter in diameter in the middle part, but taper somewhat toward the stigma, and very markedly toward the base, where they are less than 0·1 millimeter in diameter. The epidermal cells (ep), which may be readily studied without sectioning or treatment with reagents, are for the most part about 0·04 millimeter wide, 0·10–0·15 millimeters long, and (as may be seen on the margins, by focusing) 0·05 millimeter thick. The central core appears darker than the transparent margins, owing to the greater density of the parts as well as to the greater thickness. Treatment with potash discloses spiral and annular vessels and rows of accompanying crystal cells (k), each containing a crystal cluster. The stigmas of rosaceous fruits are studied with difficulty owing to the fungous growths, which often completely hide the papillæ, even after treatment with reagents or cooking.

Examination of Strawberry Preserves.—The styles and achenes may be readily picked out with forceps and examined as to their size and shape, under a simple lens. The former, transparent in the fresh fruit, and rendered still more transparent by the boiling with sugar, may be studied under the compound microscope without further treatment. Their size (2 millimeters long), narrow base and large transparent epidermal cells, are especially characteristic ; but the spiral vessels accompanied by crystal clusters, and the stigma, often bristling with fungous threads, further aid in the identification. Crystals are clearly differentiated by the aid of polarizing apparatus.

For the study of the pericarp and seed, cross sections should be prepared, holding the achene between pieces of soft wood or in a hand-vise during the cutting. Especially striking are the two endocarp layers made up of sclerenchymatized fibers, running longitudinally in the outer, transversely in the inner layer, the endosperm made up of a single cell layer and the relatively large embryo. The testa with adhering endosperm may be isolated after cutting open the pericarp and studied in surface view under a compound microscope. The reticulated cells of the outer layer are highly characteristic.

In mounts prepared by placing on a slide a portion of the jam freed from seeds, and pressing it into a thin film with a cover glass, may be seen the tissues of the receptacle, of which the long, pointed, thick-walled hairs and the long strands of vascular elements are of diagnostic value. Debris resulting from the disintegration of the cortical parenchyma cells with their shriveled contents forms a considerable part of the jam, but has little use in identification.

THE RED RASPBERRY.

Rubus Idaeus L. occurs native in various parts of the Old World, and is the parent of the raspberries cultivated in European gardens.

Bailey[1] states that the red raspberries cultivated in America are offspring of the native *R. strigosus* Michx., which, however, is closely related to the European raspberry *R. Idaeus* L. The yellow varieties are but albino forms of these species. A red variety of *R. Idaeus* grown in England, several red and yellow garden varieties of *R. strigosus* grown in New Haven, were studied by the writer, and were all found to be practically identical both in macroscopic and microscopic structure.

Macroscopic Structure.—The raspberry, blackberry and other bramble fruits (*Rubus*) are intermediate in both macroscopic and

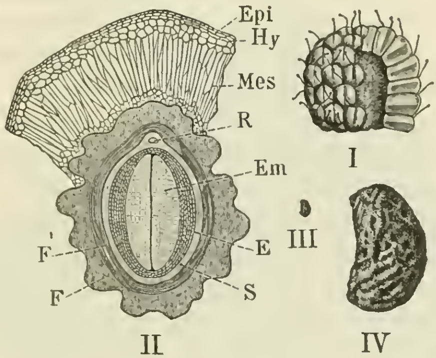

FIG. 7.—Red Raspberry. I Compound fruit, × 1. II Transverse section of a drupelet, × 32. Epi, epicarp; Hy, hypoderm; Mes, mesocarp; F, outer endocarp; F′, inner endocarp; S, testa; R. raphe; E, endosperm; Em, embryo. III Stone, × 1. IV Stone, × 8.

microscopic structure between the strawberry (*Fragaria*) and the stone fruits (*Prunus*). They resemble the strawberry in that they are compound fruits with numerous individual fruitlets on a common receptacle (although unlike the strawberry, the cortex of the receptacle is not fleshy, and bears the fruitlets on elevations, not in depressions); and they resemble the stone fruits in the structure of the pericarp and seed, each individual fruitlet being in fact a miniature drupe. The resemblance between the raspberry drupelet and the peach is especially striking. In both the epicarp is pubescent,

[1] *Loc. cit.*, p. 287.

the mesocarp is fleshy, the endocarp (*Fig.* 7, III and IV) is a hard stone with wrinkles on the surface, and the united testa and endosperm form a thin coat for the relatively large embryo. They are also very similar in histological structure, as is noted further on.

The drupelets are crowded together on the top and sides of the receptacle, each having a convex top or exposed surface and four to seven facets on the sides formed by the pressure of the adjoining drupelets (*Fig.* 7, I). These facets are usually slightly convex or concave. Owing to their crowded arrangement, the thickness of the flesh in the sides of the drupelets is much less than in the outer part. The exposed surface and the angles between the facets are pubescent, the facets themselves glabrous. In picking a raspberry the drupelets separate from the receptacle, clinging together in the form of a cup. Tschierske states that the individuals cling together, first, because of the closely fitting adjoining facets, the slightly convex surface of one fitting into a corresponding concave surface of another; and, second, because of the interlocking of the crooked hairs. The style is about 4 millimeters long and arises from the upper edge of the exposed surface of the drupe, appearing to come from between the drupelets.

Histology.—Tschierske[1] gives a valuable description of the structure and development of the pericarp, endosperm and style of the European *R. Idaeus*, but (as in the case of the strawberry) neglects the testa. Marpmann[2] gives a short description of some of the tissues. Villiers and Collin[3] describe briefly the microscopic appearance of the style and fragments of epicarp as seen in the jelly, illustrating their description with an inaccurate cut.

Receptacle.—(1) The Epidermis resembles somewhat the epicarp of the fruit, but the hairs are less numerous and usually thicker walled.

(2) Cortex.—As no sarkogen layer is developed in the raspberry the cortex layer is thin, the bulk of the receptacle being the pith.

(3) Bundles.—It follows from what has been stated that the main bundles run near the surface of the receptacle. They are shorter and more strongly developed than in the strawberry, with larger and more numerous vessels.

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[1] *Loc. cit.*, pp. 612–628.

[2] *Loc. cit.*, 102.

[3] Traité des Altérations et Falsifications des Substances Alimentaires, Paris, 1900, 829.

(4) The Pith consists of round parenchyma cells, devoid of cell contents, with intercellular spaces.

Pericarp.—(1) The Epicarp or Epidermis (*Fig.* 7, Epi, *Fig.* 8) on the facets of the drupelets consists entirely of polygonal cells, but on the exposed surfaces consists of polygonal cells and hairs, the hairs often being so numerous that they occur at two to four of the angles of the polygonal cells. Five or six cells frequently meet at the base of the hair, forming a rosette about it. The hairs vary greatly in length, up to 0·7 millimeter. Most of them have thin walls (0·0005 to 0·0015 millimeter) of nearly uniform thickness from the base to the blunt apex, and show a broad lumen (h); but some of the longer forms have thick walls and a narrow lumen resembling the strawberry hair (h′) The thin-walled hairs are commonly sinuous.

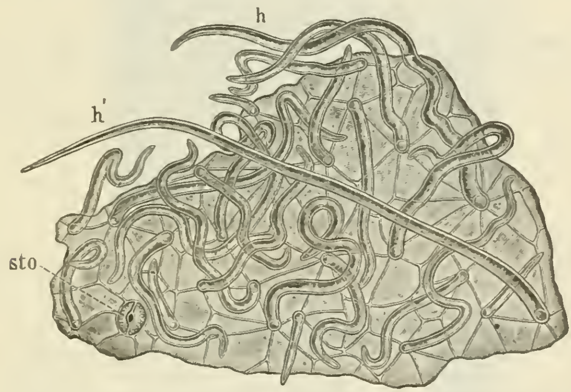

FIG. 8.—Red Raspberry epicarp with h′, straight hair, h, sinuous hairs and sto, stoma. × 160.

(2) Hypoderm (*Fig.* 7, Hy).—Two or more cell layers of collenchyma form the hypoderm (a water tissue), serving to retard the evaporation of the fruit juice.

(3) Mesocarp (*Fig.* 7, Mes).—The outer two or three layers of the mesocarp consist of isodiametric cells with intercellular spaces, interspersed with crystal cells; but further inward, at least in the thicker portion of the fruit, the cells are enormously elongated in radial directions and are without intercellular spaces. Tschierske points out that the succulent nature of the fruit results from the radial growth of cells, not as in the strawberry from the formation of numerous isodiametric cells by a meristematic layer.

As in all the species of *Rubus*, cells with crystal clusters are common, particularly near the base of the style. Reticulated cells occur in the inner layers adjoining the endocarp.

(4) Outer Endocarp (*Fig.* 7, F, *Fig.* 9, lf).—Owing to the deep wrinkles the thickness of this coat is exceedingly variable. As in

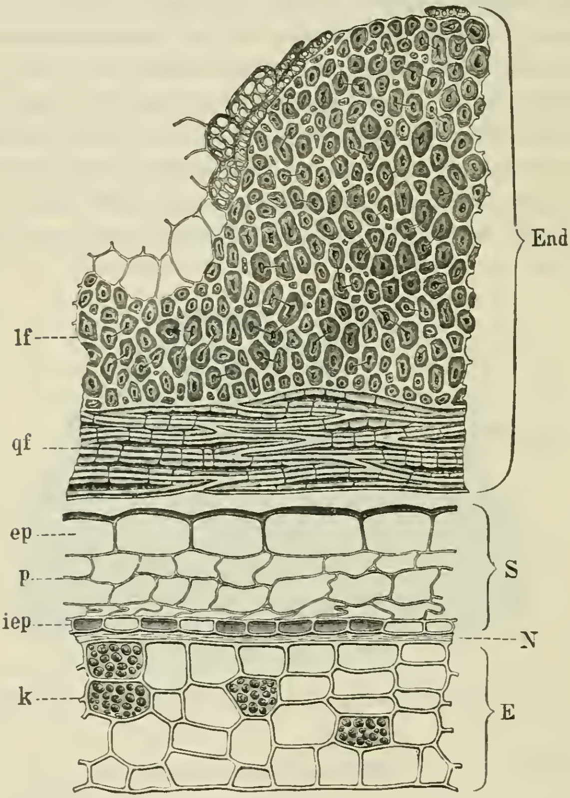

Fig. 9.—Red Raspberry. Endocarp and seed in transverse section. End, endocarp consisting of lf, longitudinall extended fibers, and qf, transversly extended fibers ; S, testa consisting of ep, epidermis, p. parenchyma (nutritive layer) and iep, inner epidermis ; N, hyaline layer (nucellus) ; E, endosperm with k, aleurone grains. × 320.

the strawberry, the sclerenchyma fibers are longitudinally arranged and cross those of the inner endocarp at right angles. The fibers are a little narrower than in the latter fruit, and in cross sections are usually elliptical-polygonal, with the longer diameters in radial directions.

The writer finds that the walls of these fibers are made up of two thickened layers, an outer or secondary membrane and an inner or tertiary membrane, the two differing greatly from each other in their refractive power and their deportment toward reagents. As the middle lamella is inconspicuous, the double outer membranes in transverse sections form a net-work like that of ordinary thick-walled polygonal cells. The thickness of this double outer membrane is about the same as the thickness of the inner membrane and the diameter of the cell lumen. Zinc chloride iodine stains the outer membrane yellow, the inner blue; and safranin also serves to differentiate the two layers. In longitudinal section numerous pores passing through both membranes are evident. This interesting structure of the raspberry fibers, similar to that of the bast fibers of various plants,[1] appears to have escaped the attention of investigators.

(5) Inner Endocarp (*Fig.* 7, F^1, *Fig.* 9, qf).—The fibers of this coat, of which there are four or more thicknesses, are the same as in the outer endocarp, but run transversely about the fruit.

[*To be continued.*]

PROGRESS IN PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE LITERATURE RELATING TO PHARMACY AND MATERIA MEDICA.

By M. I. Wilbert,
Apothecary at the German Hospital, Philadelphia.

Not for many years has there been so much evidence of concerted, as well as individual, effort to improve the status of pharmacy in English speaking countries, as at the present time.

In our own country the adoption of the prerequisite law, by the State of New York, is probably the event of greatest moment. This law carries with it not alone the requirement of graduation from a college of pharmacy, but also requires a certain amount of preliminary education on the part of the applicant. While it is true that this latter requirement has been made comparatively low, it will, nevertheless, compel colleges of pharmacy who expect to draw students from New York State, or whose students expect to come up for the examinations of the New York State Board of Pharmacy, to institute entrance examinations that will correspond to the pro-

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[1] See Tschirch, Angewandte Pflanzenanatomie, 1889, pp. 189–190.

visions of the New York State law. So that, in this one instance alone, the effects of the law, apart from being of advantage as a precept, are directly of advantage by virtually compelling colleges of pharmacy in other States to conform their entrance requirements with the provisions of the New York State law for preliminary education.

Another promising indication of improvement is in the broadening influence that must necessarily result from the amalgamation of colleges of pharmacy with the greater and more influential universities. Following the example that was set by the College of Pharmacy of the City of New York, the Maryland College of Pharmacy has recently become the Department of Pharmacy of the University of Maryland. In this latter instance it would appear that the union is even closer and more complete than in the former. The professors of the college of pharmacy have been elected professors of the university and the coming course of lectures is to be given in the university buildings.

The influence that the university environment must necessarily have on the students, apart from any improvement in the curriculum of the school, will prove of value in giving them a broader and better outlook and in improving and enlarging their circle of acquaintance.

In Great Britain the agitation for university degrees for students of pharmacy is about to bring satisfactory results. The court of the Victoria University, Manchester, has decided to provide for a suitable course for the degree of B.Sc. in Pharmaceutics. The degree will be the equivalent of the degree of Bachelor of Science in ordinary, but will include studies particularly adapted to the needs and wants of pharmacists. (*Phar. Jour.*, May 24, 1904, page 678.)

The great Scottish universities are also considering the problem of providing suitable courses of instruction and of granting degrees in pharmacy. It is proposed to institute a Bachelor of Science in Pharmacy degree, carrying with it all of the privileges of the Bachelor of Science degree in ordinary, and leading up to a Doctor of Science degree at the end of five years.

On the Continent of Europe probably one of the most interesting events of the last few months was the retirement from active teaching work of Prof. Dr. August Ritter Vogl v. Fernheim, professor of pharmacology and pharmacognosy in the University of Vienna,

who is frequently alluded to as the father of pharmacology. On July 2, 1904, Professor v. Vogl was tendered a public ovation, on which occasion he was also made the recipient of a "Festschrift." Professor v. Vogl has been connected with the University of Vienna for forty years as a teacher and for thirty years as the director of the Pharmacological Institute. Much of his work has been done along pharmacognostic lines, and his publications in this particular field are numerous indeed, including, as they do, an uninterrupted series since 1853. Professor v. Vogl's efforts to advance our knowledge of plant structure has been repeatedly recognized. He was the recipient of the Flückiger medal in 1894 and of the Hanbury medal in the following year (1895). Among the numerous scientific societies that have elected him to honorary membership the Philadelphia College of Pharmacy is not the least. This institution elected him in 1893 as a corresponding member and at the annual meeting of the college in March, 1904, he was elected an honorary member of the same institution.

Repeating Prescriptions.—The unauthorized repetition of prescriptions has been the occasion of considerable correspondence that has been published in the *British Medical Journal*. This published correspondence has caused the Medico-legal Committee of the British Medical Association to propose a set of resolutions to be discussed and acted on at the meeting of that association at Oxford. The committee appear to believe that it will be necessary to bring about some changes in the existing legislation and recommend that the Pharmaceutical Society be approached with a view of having a conference on the subject. The further recommendations of the committee propose that the physician indicate on each prescription a time limit and the number of times that it is to be refilled, and that the dispenser be obliged to duly stamp each prescription every time it is dipensed and to refuse to refill the same after the indicated number has been reached or the indicated time limit has expired. (*Chem. and Drug.*, May 14, 1904, page 780.)

The metric system of weights and measures is still attracting considerable attention, in one way or another, both in this country and in England. The *Pharmaceutical Journal* (June 9, 1904, page 797), in an editorial note, says: "Our American correspondent states that the action of the pharmacopœia authorities in ruling out every other system but the metric has had the effect of making the "U.S.P."

more or less impractical. The experience is particularly interesting, in view of the expressed willingness of the General Medical Council to make the metric system the only system of weights and measures official in the coming edition of the British Pharmacopœia."

Acetanilid is reported in several of the German pharmaceutical journals as being at times contaminated with acet-toluidin, and it is recommended to test doubtful samples of this possible admixture.

Antiseptic Paper.—A recent German patent covers the addition of various antiseptics to paper pulp before the same is passed through the machine. The proposed uses are for wrapping, or protecting, readily decomposed articles or food stuffs. The antiseptics that have been used in this way are boric acid, salicylic acid and thymol. (*Phar. Zeit.*, 1904, page 461.)

Cellotropin-mono-benzoyl-arbutin is recommended as a remedy in tuberculosis and scrofula. Cellotropin is prepared by the interaction of arbutin and benzoyl chloride, and forms a tasteless and odorless powder, insoluble in most organic solvents and only slightly soluble in water and in alcohol. Under the influence of hydrolytic agents it is decomposed into benzoic acid, hydroquinone and glucose. (*Phar. Jour.*, June 23, 1904, page 1001.)

Cod-liver Oil.—A market report in the *Pharmaceutical Journal*, (June 11, 1904, page 818) notes that the production of cod-liver oil in Norway during the past season amounts to an aggregate of 12,770 barrels, as against 2,300 barrels in 1903. While the figures for 1904 show a decided increase over the abnormally low yield in 1903, they are still far below the aggregate of previous years. The amount produced in 1901, for instance, being 28,210 barrels.

Gallogen.—This is a trade name for ellagic acid. It is obtained by heating a mixture of gallic acid and iodine. It may also be obtained by extracting the pods of divi-divi with alcohol, and precipitating the alcoholic extract with water. The precipitate contains ellagic-gallic acid that on heating to 110° C. is converted into ellagic acid.

Gallogen is an odorless, yellowish, crystalline powder, insoluble in neutral or in acid liquids, but readily soluble in alkaline liquids. It is almost insoluble in ether, and is only slightly soluble in alcohol. Gallogen has been suggested as an active and reliable intestinal astringent, and is to be given in doses of from ·30 to ·60 four to six times a day (*Apoth. Zeitg.*, 1904, page 178).

Iodylin.—Iodo salicylate of bismuth is a stable, light-gray powder that has been recommended as an odorless, non-toxic and non-irritating substitute for iodoform. The preparation is said to be useful in suppurating and granulating wounds, as a dusting powder, and is not followed by any of the untoward results that frequently accompany the use of iodoform. (*Phar. Post*, 1904, page 292.)

Isopral.—Trichlor-isopropyl alcohol, a crystalline body freely soluble in water. It is said to be an efficient hypnotic, resembling in this respect chloral hydrate, chloretone and trichlor-ethyl alcohol. Isopral is said to be more efficient and less toxic in its action than chloral hydrate. It may be given in doses of ·50 to ·75. (*Phar. Post*, 1904, page 292.)

Lecithin.—This name is applied to a number of organic combinations of phosphorus that occur in animal as well as in plant structures, usually as more or less complex derivatives of glycerinophoshoric acid. Lecithin occurs in the blood of animals, in the yolk of eggs, in the sperm of mammals and in the milt of fish; also in a number of seeds of plants—particularly in those of the Gramінaceæ. The commercial varieties of lecithin are most frequently prepared from the yolk of eggs. It usually occurs as a white, hygroscopic substance, more or less soluble in alcohol, chloroform, or ether, but insoluble in water. It has been prepared, and may be given, in a number of ways, and is indicated in all affections where the use of phosphorus would be of advantage. The literature on lecithin, particularly in Germany, is quite extensive, and is rapidly accumulating.

Lactucon.—This substance has been isolated from lactucarium; it is odorless and tasteless, and is insoluble in hot or cold water. Lactucon is soluble in ether, benzol, benzine, chloroform, carbon disulphide and hot alcohol, but only slightly soluble in cold alcohol. It has a melting point of 184° C., and occurs in small acicular crystals. According to E. Sperling, it has the chemical formula $C_{23}H_{36}O_2$. (*Phar. Zeitg.*, 1904, page 310.)

Maretin, methylated acetanilid.—This occurs as a white crystalline compound, melting at 183° or 184° C. It is soluble in 1,050 parts of water, and only slightly soluble in ether, chloroform or alcohol. Maretin possesses antipyretic properties, and may be given in doses of ·20 three times a day. (*Süd. Deut. Apoth. Zeitg.*, 1904, page 432.)

Oxalic acid as an expectorant; V. Poulet has used oxalic acid as

an expectorant, in asthma, bronchitis and similar affections, with satisfactory results. He recommends the following:

Acid oxalic	2·00
Infusion of tea	190·00
Syrup of orange peel	75·00

Mix.

One teaspoonful every hour. (*Apoth. Zeitg.*, 1904, page 71, from *L'Union Phar.*)

Phytin.—Acid magnesium and calcium hydro-oxy-methylene-diphosphate is said to contain 22.8 per cent. of plant phosphorus in organic combination. (*Phar. Centh.*, 1804, page 376.)

Neuronal.—Brom-diethyl acetamide; has been recommended as an efficient hypnotic. It is given in doses of from ·50 to 1·50, followed by a hot drink—preferably a cup of tea.

Salite.—A salicylic acid ester of borneol; is an oily liquid, insoluble in water and only slightly soluble in glycerin, but is readily soluble in alcohol, ether or the fixed and volatile oils. Salite is decomposed by alkalies into salicylic acid and borneol. It has been used, mixed with equal portions of olive oil, as an external application in articular rheumatism and in neuralgia. (*Phar. Post*, 1904, page 386.)

Stagnin.—A substance prepared from the spleen of animals; occurs as a yellowish-brown water-soluble powder. The preparation has been used with some success to increase the coagulability of the blood, and it is presumably from this action that it has derived its name. (*Phar. Centh.*, 1904, page 438.)

Vioform.—Iodo-chlor-oxy-chinoline occurs as a grayish-yellow powder, perfectly stable in air, tasteless and nearly odorless. Among other advantages that are claimed for this iodine preparation is the fact that it may be heated to 100° C. for an hour or more without decomposing it in any way. Vioform has been recommended as an efficient substitute for iodoform. (*Phar. Centh.*, 1904, page 240.)

CORRESPONDENCE.

ENTRANCE REQUIREMENTS FOR COLLEGES OF PHARMACY.

In view of the importance which the subject of entrance requirements has assumed in various institutions of learning in recent years, and more especially as the subject will come up for consideration at

the next meeting of the Conference of Pharmaceutical Faculties, at Kansas City, in September, the editor of this JOURNAL invited the attention of various teachers in pharmaceutical schools and colleges to a paper by Prof. W. M. Searby in the August issue of this JOURNAL, and asked them to discuss the subject. The time seems ripe for the *discussion* of this fundamental problem in pharmaceutical education, and it is hoped that the time is not far distant when concerted action on this question can be taken, not only by schools of pharmacy but by boards of pharmacy as well.

The following are the replies which have been received:

AUGUST 5, 1904.

To the Editor of the AMERICAN JOURNAL OF PHARMACY:

Referring to the article in the August issue of your JOURNAL, written by Prof. W. M. Searby, concerning entrance requirements in schools of Pharmacy, I wish to say this:

High-school graduation or its equivalent cannot be made an entrance requirement of schools of pharmacy without the aid of the boards of pharmacy. A great majority of the students that attend the pharmaceutical schools come from the drug stores. The young men that enter the drug-stores are not high-school graduates, and they never will be until the boards of pharmacy, in their wisdom, insist upon it.

I believe that of the apprentices in the drug-stores only a small proportion have more than a grammar-school education. Surely the better educated among those boys are the ones who go to the pharmaceutical schools, and only a very small proportion of those who go to the pharmaceutical schools in general seem to attend those schools that require high-school graduation or its equivalent as a condition of entrance. The great bulk of the college students of pharmacy evidently attend the schools that have not yet established any higher entrance requirements than the education necessary for admission to the high school.

This question has been discussed in the American Pharmaceutical Association and the pharmaceutical journals for fifty years, and a further discussion of it will certainly continue to be fruitless unless it takes a new direction. I am decidedly of the opinion that whenever the boards of pharmacy conclude that high-school graduation is one of the necessary qualifications of pharmacists, all the pharma-

ceutical schools will gladly adopt high-school graduation as a condition of admission, and that they will not do so under any other circumstances, because they cannot.

In this school only about one-third of the students have a completed high-school education or its equivalent, only two-thirds have had as much as two years' high-school work, and the remainder have been admitted to high school or have had one year of high-school work. Completed high-school work is required for the course leading to the degree of Pharmaceutical Chemist, but if we should require that grade of preliminary education of all our students it is absolutely certain that all students who do not have a high-school education would simply be driven into other pharmaceutical schools and nothing would be gained by such a course, as no distinction is made on the basis of general education when these young men present themselves before the boards of pharmacy for examination and registration. They would all remain in pharmacy.

Good general education is, to my mind, of far greater importance in our efforts to advance pharmaceutical education than either special education in the schools of pharmacy or the training in the shops, because it lies at the bottom of all, and wherever the foundation is poor the structure will be correspondingly weak.

I have for many years felt that the pharmacy laws confer vast discretionary powers upon the boards of pharmacy which the boards have never used. The boards have it in their power to insist upon adequate preliminary education before the examinations they hold and before issuing licenses. Probably the boards have not held this view or perhaps they have not even thought of it. If at the approaching joint conference of the State boards of pharmacy and the conference of pharmaceutical faculties this question should receive full consideration, I believe that the boards of pharmacy may be expected to establish a much better standard of general education for admission to the ranks of pharmacy than is now prevailing, and I also believe that the schools of pharmacy will do all that the boards of pharmacy see fit to prescribe, and probably much more.

The responsibility for the low standard of education in pharmacy, as compared with that in other professions, certainly rests with the boards of pharmacy and not with the colleges. The pharmacy laws uniformly require the boards to examine into the qualifications of the candidates for registration and to register only those whom they

find fit. I do not believe that it is too much to expect that these laws be so construed as to require at least two years of high-school work immediately and full high-school graduation within five years, as a preliminary to registration by the boards, and whenever the boards so decide the good schools of pharmacy may be depended upon to conform.

There is no civilized country in the world requiring less than high-school graduation or its equivalent for admission to the ranks of pharmacy except England and America, and I am sure that America is ripe for a decided step forward. There will be no objection on the part of druggists in business, who, as employers, are financially interested in this subject, for while it is probably true that the wages of drug clerks will be somewhat increased if none but high-school graduates can ultimately become full-fledged pharmacists, it is also true that the number of druggists will not grow as rapidly as in the past, and druggists already registered and in business will not object to having competition diminished.

Yours truly,

OSCAR OLDBERG.

NORTHWESTERN UNIVERSITY.

AUGUST 9, 1904.

DEAR SIR:—I endorse practically all of Professors Searby's article on "Entrance Requirements," which appeared in the August number of the AMERICAN JOURNAL OF PHARMACY. The entrance requirements should not fall below an education equivalent to that obtained from a good high school. Now is as good a time for a universal movement that way as any. Let us do it voluntarily before we are forced to it by the other professions or have lost our prestige. Pharmacy is a young profession, and it has gained much in the eyes of the public. We must move along with other professions, or we will lose what has been gained.

The thing that has impressed me more than anything else, perhaps, is the scarcity of good clerks. Calls come repeatedly from all over our land for good clerks, and the supply does not meet the demand. I believe that if the colleges required their students to have a high-school education, or its equivalent, before entering college, that this demand would be met. I believe that we are going to see better times for the drug clerks—I mean good clerks—and for professional pharmacy.

I am optimistic enough to believe that if those colleges who are now requiring a high-school diploma, and those who are now willing to require it, in three or four years would come together, the number would not be so small as some think, and that other colleges would fall into line, either from choice or necessity. I hope that some definite action will be taken at the Kansas City meeting.

Yours very truly,

E. A. RUDDIMAN.

VANDERBILT UNIVERSITY.

AUGUST 10, 1904.

MY DEAR PROFESSOR:—Your request of recent date came during my absence from the city, hence the delay in the reply.

I am heartily in accord with the resolutions which Dean Searby, or Dr. Schneider, intend to introduce for adoption at the conference at Kansas City.

This college, during its twelve years' existence, has demonstrated that the requirements of a full four-years' high-school training as a prerequisite to entrance to a college of pharmacy, is feasible. For the past six years our student-body has been made up of more than 90 per cent. of full four-year high-school graduates. Prior to that the percentage fluctuated between 75 and 88 per cent. The 10 per cent. that are not high-school graduates have nearly all an academic training equal to a high-school training. A dozen years ago we accepted only about 40 per cent. of the applicants for admission. I made successful efforts to inform the pharmacists of the State that we would, from year to year, increase our entrance requirements to a point where nothing less than a full four-year high-school training, or its equivalent, would be accepted. This warning, which I have since kept fresh in the minds of pharmacists and prospective students, has resulted greatly to the advantage of pharmacy in this State, inasmuch as the percentage of applicants that had to be rejected each year has steadily grown less. Of our seventy students of two years ago, sixty-five were high-school graduates, and of our sixty students last year fifty-four were high-school graduates. Those that were not high-school graduates were required to enter upon our three-year course and to carry certain academic studies in their first year, so that their preliminary training would equal that of the average of our students.

This progress was made in the face of strenuous opposition.

One of the most important results of this adherence to a high standard is the undoubted fact that we attract students of a higher calibre and standing than we would if our standard were lower. The students of this department are, as far as preliminary training, scholarship and general standing are concerned, on a par with those of the other departments of the University. Of course, not all students residing in Minnesota and studying pharmacy are enrolled with us; probably not half.

We, here in Minnesota, are not content, however, with having established the high-school qualification, but we have aimed at the same time to increase the professional requirements; in this we have also been very successful. For the past ten years I have laid the foundation for a law making a college training in pharmacy obligatory for all those who desire to practice pharmacy, and in 1903 I succeeded in having a resolution adopted by our State Association, instructing its legislative committee to take all necessary steps to have such a law enacted when the Legislature meets in January, 1905.

As the Association has always in the past succeeded in having all such laws passed which it favored and in killing all such bills of which it disapproved, we feel quite certain of success.

Very truly yours,

FREDERICK J. WULLING.

THE UNIVERSITY OF MINNESOTA.

AUGUST 11, 1904.

Dear Professor Kraemer:

Your favor of the 1st instant, calling attention to an article in the last issue of the AMERICAN JOURNAL OF PHARMACY by Professor Searby, entitled "When Shall High-School Graduation or its Equivalent be Enforced by Colleges of Pharmacy as a Condition of Entrance," was duly received.

I am in hearty accord with Professor Searby upon the general proposition of higher education as a requirement for entrance into our colleges, but believe the interests of all concerned demand that when first introduced such requirement shall be somewhat less than high-school graduation, for while this standard is most desirable and must ultimately be attained, we must keep in mind the possible effect of too high a standard upon the retail drug trade and guard against a reduction in the number of college graduates as clerks.

I believe we should have as much uniformity as possible throughout the different States; that the regulations should be made through legislative enactment rather than simple agreement; that the original law should not provide for raising the requirements annually, but this important matter be left for consideration after the effect of the first requirements is known, and that the diploma of such colleges as maintain the regulations be required as a prerequisite to examination by a board of pharmacy.

Very truly yours,

WM. C. ANDERSON.

BROOKLYN COLLEGE OF PHARMACY.

AUGUST 11, 1904.

Dear Professor Kraemer:

Would that we could say in answer to Professor Searby's question, "When shall high-school graduation be enforced by colleges of pharmacy as a condition of entrance?" "This instant." Such, I believe, is the feeling of every honest teacher of pharmacy.

But the question is, can we afford such a stand at this moment, when men rejected by the schools because lacking a high-school education, can "bone up" by some other agency, and make the registered pharmacist examination, with no questions asked by the board as to preliminary training?

I am, therefore, forced to answer the query: "Either when none but graduates are permitted to take the registered pharmacist examination, or else when the board demands high-school training of non-graduates."

My views on this subject are set forth at length in the enclosed paper.[1] Sincerely yours,

H. V. ARNY.

CLEVELAND SCHOOL OF PHARMACY.

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[1] *Midland Druggist*, January, 1902, pp. 413-415. In this paper Professor Arny says, among other things: "Let no man be given the registered pharmacist certificate unless he possesses a diploma of a reputable college, one answering all the requirements laid down by the State Pharmaceutical Association. Of course, the candidate must also pass an examination of the board, and the harder this examination is made the better will the conscientious teacher be pleased. This will insure thoroughly educated pharmacists in the new generation; this will lessen the number of druggists and drug stores to the point where the calling will again be one of fair profit."

THE AMERICAN
JOURNAL OF PHARMACY

OCTOBER, 1904.

THE THEORY OF INDICATORS AND ITS BEARING ON THE ANALYSIS OF PHYSIOLOGICAL SOLUTIONS BY MEANS OF VOLUMETRIC METHODS.

BY G. H. A. CLOWES, PH.D.
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I. Introduction.

II. Regarding the nature of indicators and theory of their action.

III. Behavior of indicators towards mineral and organic acids.

IV. Behavior of indicators towards bases, soda, ammonia, etc., and the amido bases.

V. Behavior of indicators towards proteids, albumoses, peptones, etc.

VI. Use of indicators in titrations of normal stomach contents.

VII. Titration of tryptic digestion products.

VIII. Deductions obtainable from this work regarding the constitution of proteids.

IX. Titration of blood serum.

X. Titration of urine.

XI. Summary.

I. INTRODUCTION.

For a considerable period of time clinicians have been in the habit of basing their diagnoses of cancer and other pathological conditions of the stomach to no small extent on the results obtained from the chemical analyses of the contents of that organ. There is also an increasing tendency to titrate blood serum, urine, etc., with a view to throwing some light on the nature of the pathological changes involved in faulty metabolism. One factor which has eris-

ously militated against proper correlation and utilization of these results has been the promiscuous employment of widely differing types of indicators, with the result that the figures obtained by different investigators are seldom comparable. When, therefore, a series of experiments was commenced in this laboratory with the object of affording, so far as possible, a clear insight regarding the nature of the disturbances in metabolism taking place in cancer and allied conditions, it became necessary to systematize existing methods or adopt new ones. A careful consideration of the published work of clinicians, in so far as chemical analyses are concerned, makes it apparent that the empirical results, more or less dependent upon the individual who obtains them, are fairly satisfactory so far as he personally is concerned, but are possessed of little scientific value. More especially is this the case when volumetric methods of analysis are employed, probably owing to the failure of the majority of workers in this field to fully appreciate the significance of the end-points of individual indicators or the nature of the extremely delicate problems in chemical equilibrium with which they have to deal. The principal object of this preliminary paper is to clearly outline the nature of the various classes of indicators used in acidimetry and alkalimetry; to study their behavior towards various weak bases and acids which may occur in the course of physiological work; further, to make a series of tests on artificial and normal stomach contents, pancreatic digests, blood serum, etc., all as an introduction, so to speak, to subsequent publications dealing with pathological conditions such as are met with in cancer of the stomach, the blood of cachectic cancer patients, etc.

Incidentally it may be remarked that work of this nature can be utilized to throw light on the constitution of the proteid molecule and the numerous products resulting from the various stages of peptic or tryptic digestion, or from the intervention of bacteria and abnormal enzymes.

II. REGARDING THE NATURE OF INDICATORS AND THEORY OF THEIR ACTION.

The indicators employed may be divided into three more or less artificial groups:

(1) Those which are especially sensitive to alkalies, as, for example, benzo-purpurin, congo-red and lakmoid, and may consequently be employed for titrating very weak bases.

(2) Those which are equally sensitive both to alkalies and acids, as for example, alizarin, hæmatoxylin, lakmus and rosolic acid, indicators which would be employed by preference when we have to deal with mixtures of moderately strong acids and bases.

(3) Those which are especially sensitive to acids, as, for example, phenolphthalein, Porrier's blue, etc., indicators which would be employed by preference in estimating the quantity of any extremely weak acid.

Indicators of the type enumerated above belong to the group of organic dyestuffs, and are endowed in addition with more or less marked acid properties ranging from those in the first class referred to above which possess one or more strongly negative or acid groups, to those in the third class, the acid properties of which are extremely weak. The color changes observed on titration are attributable to the formation of a salt of the indicator in question possessed of a different color to that of the original acid from which it is derived. This result is obtained, just as would be expected, at that point at which all the acids in the solution which are stronger than the acid group of the indicator, and consequently possessed of a greater affinity than the latter for alkali, have been neutralized. It will thus be seen that in order to titrate the weakest possible acids it is simply necessary to find indicators which possess even weaker acid properties and less affinity for bases than those possessed by the weak acid in question. It is also obvious that if we desire to determine the proportions of two or more acids present in a solution, this may be readily effected, provided the acids in question differ sufficiently in strength to enable us to find indicators possessing acid affinities lying intermediate between those of the acids involved. There are considerable limitations to the extension of this scheme, one of the principal difficulties being the impossibility of obtaining sharp end points with extremely weak acids or bases, owing to the slow and incomplete formation of salts and consequent imperfect dissociation of salts into ions, upon which the color reactions really depend.

It is a general principle in volumetric analysis that strong bases should be employed to titrate weak acids, and strong acids to titrate weak bases. This is due to the fact that weak acids and weak bases only combine with considerable difficulty to form salts and the speed of reaction even at high temperatures is extremely slow.

Attention has already been drawn to the fact that indicators are for the most part acids ranging from those in the first group possessed of considerable affinity for alkalies, and consequently more suitable for the titration of bases, to those of the third group which have the weakest acid properties, and are consequently capable, as has been explained above, of being employed as indicators for the titration of dilute acids, provided strong bases are made use of in the standard solutions. We have already considered the *modus operandi* of the third group. As we ascend the scale to the second group possessed of more marked acid characteristics it necessarily follows that the indicators of this group are less sensitive to weak acids than are those of the third group, owing to the fact that the acid properties of such indicators are more nearly equivalent to those of the weak acids which have to be titrated. They are, however, still capable of reacting with strong mineral acids, and are more sensitive to bases than are the weak acid indicators of the third group. Phenolphthalein and Porrier's blue, for example, members of the third group which may be employed for titrating the weakest organic acids, give sharp end points with soda and potash, but not with ammonia. Hæmatoxylin, belonging to the second or middle group, is capable of giving a sharp end point on titrating with ammonia, but cannot be employed for estimating the amount of weak organic acids in a solution.

As we pass from the second to the first group of indicators the acid properties become even more marked. These indicators are for the most part sulphonates of diazo compounds and possess several OH groups in addition. They are sufficiently strong acids to form salts with relatively weak bases; but, on the other hand, owing to their strongly acid characteristics, are quite indifferent to the presence of weak organic acids in solution. We have in the solution a weak base to be titrated, also a small quantity of the salt of the indicator acid. The color change is brought about when the weak base being titrated has been completely neutralized by the acid employed for titration and the slight excess of the acid added results in the liberation of the indicator acid from its salt. Differentiation between bases of different strength by means of indicators of the first group, whilst not so readily effected as is that of acids in the third group, is still perfectly feasible. Some of the indicators of the first group, as for example, phloroglucinvanillin, depend for

their action on the property which they possess of first reacting with the strong acid present in the standard solution employed for the titration after all the basic affinities present in the solution have been satisfied.

In addition to the group of indicators dealt with above others may be mentioned, such as dimethyl-amido-azo-benzol and methyl-violet, characterized by their basic instead of acid properties. Dimethyl-amido-azo-benzol being a weak base falls into class one of indicators sensitive to bases. When bases are being titrated by means of acid standard solutions the salt of the basic indicator is only formed after complete saturation of the bases stronger than it which are present in the solution. Still another group is characterized by the possession of both acid and basic properties. To this group belongs methyl-orange and the gradual transition of this substance from a yellow to a pink with an intermediate phase is attributed to the probable existence of a multivalent ion in the solution, an ion possessed at the same time of positive and negative characteristics. Wagner, in an exhaustive study of this question, differentiates still a fourth type of indicator of which alizarin sulphonic acid may be taken as an example, possessed of two negative groups capable of reacting independently according to circumstances. This indicator possesses a SO_3H group and an OH group. The neutralization of the former with alkali leads to the formation of a red color and the saturation of both to a purple. This differentiation is most marked in titrating phosphoric acid which possesses three acid groups differing considerably in their affinity for bases. The first acid group of the alizarin indicator is weaker than the first acid group of the phosphate, but stronger than the second. The second acid group of the indicator is weaker than the second, but stronger than the third acid affinity of the phosphoric acid. As a consequence we have a sharp transition from green to red on neutralization of one of the acid affinities of the phosphate molecule and a further transition from red to purple after two of the phosphate affinities have been saturated.

There is nothing to be gained by further multiplying cases of the great variation in sensitiveness of different indicators and even of one and the same indicator under varying circumstances. One important point should always be borne in mind, viz., the end point is always much sharper when the completion of the reaction results

in the formation of a salt of the indicator, whether the indicator be acid or basic, than when the change in question results in the liberation of a free acid or base.

An attempt will be made in the course of the succeeding paragraphs to show to what extent acids and bases possessed both of strong and weak affinities may be differentiated by means of the range of indicators at our disposal. It must, of course, always be remembered that, except in the case of those indicators which are exceptionally sensitive to acids, and therefore not appreciably to bases and *vice versa*, a marked interference must necessarily be introduced wherever there is a tendency on the part of an indicator to be affected by both acids and bases.

This is not the place to deal further with the constitution of indicators and the theory of their dissociation in solution with the formation of ions and the effects of dilution, etc., upon this degree of dissociation. It is merely necessary to state that both practically and theoretically certain indicators are particularly sensitive to extreme dilution, and consequently should be employed in as concentrated solutions as is possible.

III. BEHAVIOR OF INDICATORS TOWARDS MINERAL AND ORGANIC ACIDS.

In these experiments titrations were carried out by means of n / 10 NaOH and n / 10 H_2SO_4. In addition, n / 10 ammonia, n / 10 oxalic acid were employed when required. N / 10 solutions of the following acids, hydrochloric, phosphoric, oxalic, formic, lactic, propionic, butyric, aspartic and malic, were prepared with the greatest accuracy. In the case of the mineral acids, gravimetric methods were employed for the determination of the strength of the solution. In the case of the organic acids, the greatest precaution was taken to obtain pure, ammonia-free preparations, and the exact strength of the solution was in each case determined by the use of phenolphthalein and in the majority of cases confirmed by the use of Porrier's blue. Both these indicators are extremely weak acids and belong to Group 3, referred to above. The following indicators, dissolved in the most suitable solvents, were then tested in conjunction with each of the acids enumerated above, effect of time and temperature being especially noted. Of the first group, dimethyl-amido-azo-benzol, methyl-orange, benzo-purpurin and cochineal in solution, and congo-red and lakmoid, both in solution and on strips of paper, also

drops of phloroglucinvanillin, tropæolin and sugar resorcin on a warm porcelain plate, were employed. In the second group, alizarin, hæmatoxylin, lakmus, rosolic acid and guaiac tincture, and in the third group tropæolin 000, phenolphthalein, alpha-naphthol-benzine and Porrier's blue were made use of.

It would, of course, be impossible, with the limited space at our disposal, to tabulate all the results obtained. Such a work would in any case be superfluous. The great majority of indicators were found, for some reason or other, to have little value in dealing with physiological solutions owing to their complete failure to give definite end points. These experiments were necessarily carried on at the same time as those enumerated in Sections 4 and 5 on bases, proteids, albumoses, etc.; as a result, many indicators possessed of considerable value for differentiating acids had to be ruled out of consideration on account of their failure to give a sharp end point in the presence of weak bases.

In order to effect an economy of space the general tables of this section have been omitted, the most important points being summarized in the following paragraph:

Notes and Conclusions.—Phosphoric acid may most readily be titrated, making use of alizarin as indicator for the determination of the first acid group of phenolphthalein to indicate the termination of the second acid group, and of phenolphthalein in the presence of barium chloride and an excess of alkali in a boiling solution for indication of complete saturation of all the acid affinities.[1]

(2) Phenolphthalein gives a good end point for determining the total acidity of any of the acids enumerated above, with the exception of the third acid group of phosphoric acid, and failing beyond the first acid affinity of malic and aspartic; but on account of its sensitiveness to ammonia cannot be employed in the presence of large quantities of that substance, as will be seen later.

(3) Porrier's blue may be employed in the place of plenolphthalein where large quantities of ammonia are present, as it is entirely indifferent to that substance. It is also slightly more sensitive than phenolphthalein to some of the weaker organic acids, but, generally speaking, gives an inferior end point, consequently its employment

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[1] See this JOURNAL, July, 1903. A note on the quantitative estimation of phosphates in stomach contents.

is not to be recommended when phenolphthalein is equally serviceable.

(4) The differentiation of organic acids, generally speaking, from mineral acids, may in the absence of phosphates be most readily effected by means of phloroglucinvanillin drops on a porcelain plate, the temperature of which is kept slightly below the boiling point of water, the end point being that point at which the faint pink finally disappears, and does not reappear on cooling. Dimethylamido-azo-benzol, commonly employed in volumetric work, is practically useless for this purpose, unless the observer be especially trained to note the first change from pink to orange red. This indicator is not to be recommended. Tropæolin oo may be utilized to distinguish between mineral and organic acids when used in the form of drops on a hot plate, if the precaution is taken of observing only a permanent purple end point and not a temporary brown coloration. In the presence of phosphates phloroglucinvanillin drops give a slight reaction, but with experience in using the method the effect produced by phosphates, especially when present in small quantities, may be disregarded. With tropæolin, whilst hydrochloric and sulphuric produce a permanent purple coloration, phosphoric acid first produces merely a permanent faint slate color, and that stops short of the complete saturation of the first acid affinity of this substance.

(5) Carbonic acid exhibits most interesting characteristics. Sodium carbonate, Na_2CO_3, when dissolved in water, is neutral to Porrier's blue. The phenolphthalein end point is obtained after saturation of one of the sodium affinities with acid, and the end point of alizarin, hæmatoxylin, methyl-orange, and especially of the phloroglucinvanillin drops, is first obtained after complete saturation of all the sodium present with strong mineral acid. In other words, Porrier's blue is the only indicator which recognizes both acid groups of the hypothetical carbonic acid. Phenolphthalein is sensitive to one of them, and the other indicators enumerated are entirely indifferent to their presence.

(6) The great bulk of indicators give more or less reaction with organic acids. Very few of them, however, can be said to afford a satisfactory final end point. It is possible, for example, to obtain an end point including all mineral acids and such organic acids as lactic, butyric, etc., provided the first color changes are disregarded

and only the final end points observed, by employing such indicators as alizarin, hæmatoxylin (?), litmus, benzo-purpurin, rosolic acid, etc., but for some cause or other the majority of these indicators are ruled out by later experiments. There is, however, a noticeable difference in the behavior of the organic acids towards the same indicator as regards the first appearance of the color change and final end point. The strength of these acids diminishes as we ascend the series, as would be expected from our knowledge of their constitution.

IV. BEHAVIOR OF INDICATORS TOWARDS BASES, SODA, AMMONIA, ETC., AND THE AMIDO BASES.

In this work, which was carried out simultaneously with that recorded in a previous section, the same series of indicators was employed. All indicators give sharp end points with NaOH and KOH. Towards ammonia Porrier's blue is practically indifferent when properly employed. Phenolphthalein is materially affected, giving an end point extending over ·4 to ·5 c.c. when 10 c.c. of n / 10 solutions are employed. This indicator cannot, therefore, be used in the presence of any considerable quantities of ammonia. Alizarin, litmus, dimethyl-amido-azo-benzol, rosolic acid and methyl orange give a better end point than that of phenolphthalein, but still far from satisfactory. Hæmatoxylin and congo-red give sharp end points so long as strong acids are employed for titration. Drops of phloroglucinvanillin, tropæolin, etc., give the sharpest end points.

Having observed the behavior of indicators towards ammonia, a fresh series of experiments was carried out with a series of amido acids, asparagin, glycocol, leucin, tyrosin and aspartic acid with a view to observing the effects produced by the weak NH_2 groups present in each of these compounds upon the indicator in question. Exact n / 10 solutions of these substances were prepared, and their behavior towards certain typical indicators compared with that of the ammonium salts of formic, acetic, lactic acid on the one hand, and bodies like acetamid, formamid and urea on the other, and the results tabulated. See Table I. In order to insure as great accuracy as possible, an effort was made to employ an amount of substance which should require 25 c.c of a n / 10 solution for the recognition of each acid or alkali group, especially where such indicators

as phloroglucinvanillin drops were concerned. All the results have, however, been reduced to the equivalent of 100 c.c. of a n / 10 solution in order to afford a uniform means of comparison. Thus, if in one case 10 c.c. of a solution had been employed on account of scarcity of material, and in another case 25 c.c., the former would be multiplied by 10 and the latter by 4 in order to make the results comparable. It will be seen on examining the figures that Porrier's blue is sensitive to all the free acid groups and entirely indifferent even to ammonia and certainly to NH_2, etc. Phenolphthalein lies next, being less sensitive to acid groups and far more sensitive to ammonia than is Porrier's blue. Alizarin, the third representative we decided to use after trying a considerable number of indicators, is sensitive both to ammonia and to strong organic acid groups, so that ammonium acetate, ammonium formate, etc., are neutral. But whilst fully sensitive to ammonia in all cases, alizarin is apparently indifferent to the weak acid groups such as are present in asparagin, tyrosin, etc., and also to the amido group of those same compounds. Phloroglucinvanillin drops which, after employing various indicators, we decided upon as most valuable for weak bases,

TABLE I.

Substance Titrated, 100 c.c.	Porrier's Blue.	Phenolphthalein.	Alizarin.	Phloroglucinvanillin.	Nitrogen.
N/10 ammonia	Nil	— 100	— 100	— 100	100
N/10 formic acid + 100 c.c. n/10 ammonia	+ 105	14	+ 3	— 105	100
N/10 acetic acid + 100 c.c. n/10 ammonia	+ 105	— 8	+ 10	— 110	100
N/10 lactic acid + 100 c.c. n/10 ammonia	+ 110	+ 8	+ 10	— 105	100
N/10 malic acid	+ 100	— 100	+ 100	Nil ?	Nil
N/10 solution pure asparagin . . .	— 100	+ 25	Nil	— 100	200
N/10 glycocol	— 100	— 3	Nil	— 100	100
N/10 leucin	— 95	+ 5	Nil	— 95	100
N/10 aspartic acid	+ 200	— 100	+ 100	— 100	100
N/10 tyrosin (impure)	— 117	+ 40	Nil	— 117	115
N/10 asparagin (impure)	< — 100	— 22	+ 1	— 114	220
N/10 acetamid	Nil	Nil	Nil	— 5	100
N/10 formamid	— 15	+ 3	— 1	— 15	100
N/10 urea	Nil	Nil	Nil	— 6	200

is entirely indifferent to all weak organic acids, whether of the nature of aspartic acid or the stronger types, such as formic, acetic, lactic, etc. This indicator is of great value in differentiating the weak bases, being sensitive not only to ammonia, but also to the NH_2 group in asparagin, glycocol, leucin, tyrosin and such compounds as hydroxylamin, but indifferent to the NH_2 groups of the type present in acetamid, formamid and urea, groups that are associated directly with negative CO.

Meyer and other investigators have made the assumption that the amido acids are entirely devoid of basic characteristics. These results, however, make it apparent that a sharp differentiation between ammonia, the NH_2 group associated with carbon, to which hydrogen is attached, and the NH_2 group associated directly with the CO group, may very readily be effected.

An interesting phase of this work is shown in the results obtained rom impure tyrosin and asparagin. In both these cases the high nitrogen content indicated the probability of the formation of some type of anhydride through internal condensation. This result was entirely borne out by the figures obtained in titration after the substance had been dissolved in water, whereby any such anhydride would probably be decomposed. As a result the end point obtained with phloroglucinvanillin drops corresponded exactly with the difference that our nitrogen determination had led us to expect. The same agreement of errors attributable to impurity of the substance was observed to a modified degree in leucin. Not having methylamin or æthylamin at our disposal we were not able to test their behavior towards indicators; but from the literature it would appear probable that bodies of this type would exert, just as does ammonia, a full alkaline effect upon alizarin, and possibly even on phenolphthalein. Such bodies as æthylendiamin, having two NH_2 groups, are probably mono-basic to phenolphthalein and di-basic to alizarin, but this question will be referred to at a later stage in discussing the constitution of the proteids.

A consideration of the bearing which these results have upon the titrations of stomach contents and the constitution of the proteids, will be reserved until the action of the indicators here employed has been studied in its relationship to the various nitrogenous products present in such mixtures. The most important result of the work recorded in this section is the means which it affords of differentiat-

ing between various weak basic groups all in the presence of one another without interference with one another by means of the four indicators enumerated above.

V. BEHAVIOR OF INDICATORS TOWARDS PROTEIDS, ALBUMOSES, PEPTONES, ETC.

In order to test the effect on indicators of proteids and various products obtained from the latter by partial or complete hydrolysis, we made use of albumin solutions and solutions of Witte's peptone, especially prepared, artificial peptic digestion of egg-white, tryptic digestion of egg-white, etc.

(1) The behavior of egg albumin was tested by separating the white of two eggs and thoroughly admixing. Portions of 10 c.c. were then removed and titrated with phenolphthalein, alizarin and phloroglucinvanillin, and 1 c.c. quantities were made use of for the estimation of nitrogen. This same experiment was repeated with two more eggs, the only difference being that in the second case the egg-white was first thoroughly admixed with ten times its volume of water before making titrations and determining nitrogen. Results are as follows:

EXPERIMENT 1.

10 c.c.	= 1·1 c.c. acid to phenolphthalein.
"	= 7·6 c.c. acid to alizarin.
"	= 20·6 acid to drops.
1 c.c. N	= 12·6 n/10 acid,

from which it will be noticed that the portion from phenolphthalein to alizarin is about one-half of that from alizarin to drops, and that the whole range from phenolphthalein to drops is about one-sixth of the total N.

EXPERIMENT 2.

100 c.c. of the diluted solution	= 1·6 c.c. acid to phenolphthalein.
" " " " " "	= 8·0 c.c. acid to alizarin.
" " " " " "	= 22·0 c.c. acid to drops.
Nitrogen 1 c.c.	= 13·0 c.c. n/10 acid,

from which it will be noticed that the phenolphthalein to alizarin bears about the same proportion to that from alizarin to drops, 1 to 2, as in the previous case, and also that the total effect on indicators in titration is about one-sixth of the total nitrogen equivalent, as previously observed.

Several series of experiments were carried out, making use of the solutions of Witte's peptone, varying in strength from complete saturation to 1 per cent. This substance was employed for testing indicators in preference to stomach contents and artificial peptic mixtures, owing to its relative purity and freedom from inorganic impurities capable of producing a disturbing effect upon the end points, and also on account of the ease with which the small quantities of such substances present can be determined. The experiment was repeated on five separate occasions, peptone solutions of different concentrations and obtained from different batches being employed. In order that there should be no possible source of error due to decomposition of the peptone solution, each series of experiments was carried out in the space of twenty-four hours, as follows:

In the first case a saturated solution was obtained by shaking repeatedly 100 grammes of peptone with 10 liters of water, filtering and completely admixing the filtrate. From this clear solution 100 c.c. portions were removed for titration alone and in the presence of various acids by using each of the indicators under investigation. At the same time 200 c.c. batches were removed for the estimation of those substances capable of acting on indicators, phosphates, chlorine salts, total chlorides and ammonium chloride and organic acids, all experiments being made in duplicate. The nitrogen content of the solution was also estimated by removing 25 c.c. portions for direct Kjeldahl determinations and 50 c.c. portions were treated with an equal amount of 20 per cent. phosphotungstic acid at 70°, filtered and nitrogen estimated in the filtrate. In this case 100 c.c. of the solution was found to contain nitrogen equivalent to 92 c.c. n/10 alkali. The amount of substance capable of materially affecting the end points of indicators was practically negligible, hydrochloric acid being less than ·3 c.c., phosphoric acid ·2 c.c., and organic acids less than ·1 c.c. of n/10 alkali.

Volumetric determinations, carried out with both warm and cold solutions, between which little difference in results was observed, show as an average:

Porrier's blue indefinite, 100 c.c. peptone = over 4·0 c.c. alkali.

Phenolphthalein, 100 c.c. peptone = 4·0 c.c. alkali.

Alizarin, 100 c.c. = 4·0 acid.

Litmus, 100 c.c. = 2·5 to 3 c.c. acid, from purple to red. End point indefinite.

Phloroglucinvanillin drops, 100 c.c. solution requires from 20 to 20·5 c.c. n/10 acid.

Tropæolin drops, 100 c.c. solution requires from 22 to 22·5 c.c. n/10 acid.

Diazo, yellow-green reaction at the start gives orange-pink end point first about 15 c.c. End point indefinite.

Hæmatoxylin, congo-red, methyl-orange and rosolic acid give indefinite end points.

It will be seen from these figures that for 100 c.c. of solution there is a difference between phenolphthalein and alizarin end points of approximately 8 c.c. n/10 acid or alkali. Of this amount less than one-tenth part can be acounted for as combined HCl, acid phosphates, organic acids and other impurities. The effect observed must consequently be attributed to the peptone itself, probably to the weak basic groups contained in its molecule. Of the portion equal to 4 c.c. from the commencement to the phenolphthalein end

TABLE II.

Titration of Peptone Solutions.

No.	Phloroglucinvanillin Drops, End Point.	Alizarin End Point.	Phenolphthalein End Point.	Total Range Drops = Phenolphthalein End Point.	Drops = Alizarin.	Alizarin = Phenolphthalein.	Total Nitrogen.	Impurities—Maximum Effect.		
								HCl, Free and Combined with Proteids.	Phosphates.	Organic Acids.
1	— 7·5	— 1 6	+ 1·6	9·1	5.9	3·2	36·2	·1	—	Nil
2	— 20 0	— 4·0	+ 4 0	24·	16	8	92	·3	·2	·1
3	— 34 0	— 5·7	+ 5·1	39·1	28·3	10·8	131	·5	·4	—
4	— 64 0	— 13·4	+ 8·2	72·2	50·6	21 6	242	·8	—	—
5	— 70·0	— 17 0	+ 12	82·0	53·0	29·0	281	·9	·8	—

point, less than one-tenth can be accounted for as due to combined chlorides.

The period from phloroglucinvanillin end point to that of phenolphthalein is twenty-four, about three times that from alizarin to phenolphthalein and less than one-quarter of the equivalent of the total nitrogen present in the solution.

In the following table we have recorded results obtained with solutions of Witte's peptone varying from ·03 to ·4 per cent. nitrogen. To make clear the relationship between the nitrogen content and the titration from the phloroglucinvanillin drops' end point to alizarin and alizarin to phenolphthalein, we have recorded in one

column the amount of n / 10 acid equivalent to the nitrogen present in 100 c.c. of the solution. The titration results for 100 c.c. to the drops' end point, to the alizarin end point, and to the phenolphthalein end point are to be found in the first three columns, n / 10 acid being indicated by a — quantity, and n / 10 alkali by a + quantity. For the sake of comparison with the nitrogen content, three columns showing the range from drops to phenolphthalein, from alizarin to phenolphthalein, and from drops to alizarin have been included. The average of the seven different concentrations gives a period from drops to alizarin about twice that from alizarin to phenolphthalein; consequently the total range from drops to phenolphthalein is three times that from alizarin to phenolphthalein. A comparison of these figures shows a relationship of 3 : 1 : 2 : 10·5 for these three quantities as compared with the nitrogen.

From these results it appears possible that some sort of relationship obtains between the various types of nitrogen-containing groups in the proteid and the end points of various indicators. This question will be further considered in the next portion of this paper dealing with artificial peptic digestion. One point, however, is clearly brought out by the use of Witte's peptone: that the amount of impurities retained by the peptone hydrochloric acid, phosphates, organic acids, etc., which could produce an effect upon indicators is too small to account for any of the recorded figures.

[*To be continued.*]

PHARMACY AND CHEMISTRY AT THE WORLD'S FAIR.

By Carl G. Hinrichs, Ph.C.,
Professor of Chemistry, Marion-Sims Dental College.

(*Continued from p. 413.*)

IV. FRANCE: A LIVE PHARMACEUTICAL AND CHEMICAL EXHIBIT.

In the very large French section of the Liberal Arts Palace we find an extended display made by enterprising chemical and pharmaceutical firms. Here are not only polite guards who do give you intelligent replies to inquiries about exhibits, but also technical and commercial experts representing the separate firms. What a pleasure it is to find oneself at home after a visit to the British section!

"La chimie est une science Française." While this celebrated statement of Wurtz is a trifle too broad, still it must be admitted

France gave a wonderful impetus to scientific and technical chemistry; it boasted the greatest chemists of the ending eighteenth and beginning nineteenth centuries. To-day it is as active as ever in promoting chemical and the allied pharmaceutical research, and that it makes itself felt is seen from the great interest taken in the scientific exhibits by professional men.

In examining the wooden manner of exhibit made by the German chemical commission, I saw such important discoveries as the hydrides of barium and strontium overshadowed by crude strontium sulphide! Why should such important work, by the Nestor of German chemical science, Clemens Winkler, be hidden from the eyes of American chemists? Have the French made the great mistake of showing a so-called "educational exhibit," that hides research work of highest importance among common everyday articles of chemical manufacture? Not by any means. The French show the important research work by itself in a very prominent manner. It would be impossible to miss the separate exhibits of the Société Chimique de Paris, M. Béhal, M. Moreau and others, showing in separate cases to great advantage.

The American Journal of Pharmacy's representative had the great pleasure of meeting Monsieur le Professeur Auguste Béhal, a gentleman of unassuming and pleasing personality. Upon my request that he point out a few of the many discoveries made by himself in organic chemistry, he consented to give me those illustrating class reactions. By a class reaction is meant one that, followed up, will lead to the production of many new compounds.

Professor Béhal is the author of an extended organic chemical text. He is professor in the Paris School of Pharmacy; many of his discoveries relate to pharmaceutical products. I copy from the notes written by him in my note book: Analysis of officinal creosotes and studies on derivatives, guaiacol, studies on a new class of dicetones, derivatives of chloral such as mono- and di-chloralantipyrin, derivatives of chloralimide, on the isomers of estragol, mixed anhydrides of formic acid and their ethers, on campholenique series, etc. I find in Actualites Chimiques, Tome II, pp. 377-407, his very complete exposition of the structure of camphor. In a separate case will be found several hundred organic compounds made by M. Béhal.

On the 4th of June, 1857, three young chemists, Arnaudon,

preparateur of Chevreul, Collinet, preparateur of Dumas, and Ubaldini, conceived the idea of meeting to discuss work accomplished by the chemists in the great scientific center—Paris. Friedel, Perrot, Wurtz, Barreswill and other noted chemists of the time soon endorsed the idea of their assistants, and the Société Chimique de Paris was an established fact. To-day this is one of the most important scientific bodies in the world, and publishes a bulletin of over 3,000 pages annually. Since 1900 its members have discovered over 2,000 new compounds, which form one of the most remarkable scientific exhibits of the World's Fair. Though each sample is shown in a small glass only, still they require a large 6 by 12-foot case to house them all.

One of the most striking exhibits in the case are the delicate tests of Armand Gautier, proving that arsenic is found in all articles of food, and in all parts of the animal organism. Of course, the per cent. is very small. Only his most refined method of analysis could reveal the minute traces of arsenic present. The small apparatus actually used by Gautier is also shown. This consists essentially of three parts: an evolution flask, a decomposing tube and the mirror deposition tube. The first is essentially a small three-tubulatured Wolff bottle, holding not over 200 c.c. The central tubulature has a ground-in-glass separatory funnel; this is to hold the acid liquid to be tested. The second is a safety tube, that, by simply pressing a Mohr's pinch-cock, allows, when too rapid an evolution of hydrogen takes place, this gas to bubble through a silver solution. The third is the exit tube; this has a small bulb to catch acid mechanically thrown upwards; from this a wide tube admits of the introduction of caustic potash to retain antimony, to dry the gas and remove all traces of acid.

The now thoroughly purified gas passes to the reduction tube; this is a thin, hard glass tube encased in close-woven copper netting, and heated to redness for fully 6 inches of its length in a minute combustion furnace. At the end of the furnace an asbestos shield prevents direct heat radiation warming this portion; a linen cloth wrapped about the tube, continually wetted with water, causes a prompt cooling of the gases, and a sharply defined mirror deposits in the thin tube extension. Any undecomposed gases pass into the silver solution, where the arseniuretted hydrogen precipitates the silver. No such blackening is noted when reasonable care is exercised.

Wheat, hair and cuticle, nails, peas, muscular and nerve tissue and many other substances of animal and vegetable origin tested by Gautier were found to contain arsenic. An excellent method of destroying organic tissue was devised by him; it consists in alternately warming the material with concentrated nitric and sulphuric acids under the hood. Some thirty test capillary tubes showing arsenic are exhibited. I copied: Six egg membranes weighing five grammes showed only one thousandth of a milligramme of arsenic, which is a trifle more than the one hundred thousandth of a grain! One hundred grammes of muscle (beef) showed one thousandth of a milligramme; one quart of beer only one-fifth of one thousandth of a milligramme. You may wonder how he determines such minute quantities; it is by comparing the deposit made with test samples in which minimal but accurately known quantities were introduced into the generator and comparing the deposit with such standards.

The percentage in cuticle, hair and nails is greatest normally; so he concludes that arsenic is essential for the growth of these tissues.

From Southern France, the land of fragrant and delicate flowers, we see volatile oils, pomades and extracts. France is the home and center of the perfumery industry. Not only does it produce the most delicate of odors by enfleurage from the fragrant blossoms, but also innumerable synthetic perfumes in the French chemist's labotatory.

Hughes Ainé has an exceedingly tasty display of the natural odors. He shows beautiful imitation flowers twining about the jars containing their odor. Thus are displayed the rose, violet, tuberose, orange blossom, pomade extracts.

Chiris also has a very large case devoted to these products. Copper containers for volatile oils take up the corners of the display. Kilo pomade tins are placed at the base of the shelving, and contain jasmin, rose, tuberose and other products. Above are the extracts and volatile oils shown in vitro. Beautiful samples of cassie flowers, gum benzoin, castoreum, coumarine, together with the two large horns of civet and the six tonquin musk boxes, give us some insight of the perfumer's prime materials.

M. Charabot has a separate case devoted to some 100 samples of synthetic perfumes. Facing the British chemists on the outer aisle is the extended display of J. Dupont. Large bottles of synthetics such as Musc. S., Rubéol, Rhodénol, Heliotropin and the various

bisulphite products used as stepping stones to the pure aldehydes and ketones are instructive. Water-white synthetic pulegone, anethol, carvone, lynalyle acetate, ethyl benzoate and too many others to even mention, show that the French are very active in this important branch of modern chemistry, which is sometimes thought to be the exclusive province of another country.

Near these prime materials of the perfumer, the perfumer is himself in evidence. Of course, the French perfumer is a past-master in the arrangement of perfume displays, and also in the manner in which he prepares his perfumes for the trade. Of all the exhibits in this line at the Fair, that of E. Pinaud is the center of interest and the focus for all eyes. Mr. A. Veldhuisen, in charge, showed us the many relics that this firm has from the first empire. These comprise dainty articles that Napoleon and the Empress Marie Louise possessed. The ladies take special delight in the fountain of the unfortunate empress. This fount is continually supplying the delightful odor named after Marie Louise. A continual stream of visitors comes here to get fans, mirrors, etc., scented with this odor. The idea of Pinaud to specially push this article at the Fair, which only Napoleon rendered possible, is indeed a happy one. Samples of the various perfumes placed upon the market may be obtained by visiting druggists registering in the company's book. Their other specialties are Eau de Quinine, Foscarina, Violet Reine, Elixir Dentifrice, etc.

There are so many interesting features relating to industrial chemistry that one can only get an idea of them by spending several days at this one exhibit. For instance, Corban & Cie. make most wonderful chlorates. The crystals of sodium, potassium and barium chlorates shown are over an inch through. Chardonnet silk is made from cotton and the fibres of pine wood. The silk is of fine luster, and samples are dyed in all colors of the rainbow. In 1894 the firm used 5,000 hectoliters of alcohol; nine years later they employed more than six times as much in the manufacture of this silk.

Occasionally we run across graduates of the Philadelphia College holding important positions at the Fair. In examining the most elegant display of France's greatest chemical manufacturing house, Poulenc Frères, I met Mr. Louis J. Matós, a former assistant of Professor Sadtler, in charge. Dr. Matós was especially proud of the

many finely crystallized salts under his care. Bright red mercuric iodide is shown in large prisms, potassium iodide in large cubes, uranium nitrate in large inch crystals of a lemon-yellow tint, having a peculiar fluorescence in sunlight; one of the finest salts is the red prussiate of potash, truly red in color and finely crystallized. Iodoform in the form of crystals and powder; the former is beginning to find much favor at the hands of practitioners.

Large bottles of crystallized cacodylic acid and its salts; also methylarsenic acid and salts, both presenting arsenic in the organic form, less poisonous but still giving the strong alterative action of the inorganic salts. Many important mono-, di- and tri- varieties of the phosphates are exhibited in the form of crystals, crusts, powders and honeys. Also many lacto-, glycero- and chlorhydro- phosphates, many of which are nicely crystallized.

Of the elements, we find large cubes, really rhombohedræ of bismuth, sublimated iodine, silicon, boron, lithium metallic in long rods, and an aluminium-calcium alloy, presenting aluminium in a form that is very effective in the casting of sound steel.

Probably the most interesting of all is an anesthetic, "stovaine," a substitute for cocaine, that has none of the latter's toxic properties and still all the anesthetic qualities. This has not yet been put on the market in this country; it has been used with success in France in dental and other practice.

Large bottles of lecithine, glycogen, cholesterine, nucleinic acid used in certain cases as a nourishing adjunct, are made in large quantities by the firm.

A central portion of the case is taken up by vanadic acid and uranium salts obtained from Colorado carnotite. As an adjunct, some 75 grammes of radium-barium chloride obtained from 1 ton of the ore is shown. Many rare salts such as cerium, thorium gold and platinum compounds; also pure chemicals as used in analysis complete the exhibit.

Everything is arranged nicely in a very large case, samples are all of good size, and if you do not find Dr. Matós in charge, you usually see Mr. Sykes, the American representative. Or if you fail to see either of these gentlemen, the French guards in uniform are there to answer questions. I found M. Pierre Boissierée exceedingly attentive and polite, opening cases under his charge to explain many features; thus you see, the French are only too pleased to have visitors thoroughly examine and understand their exhibits.

La Pharmacie Centrale de France, also less known as the Pharmacie Centrale des Pharmaciens. Many in this country have heard in a hazy way of this, the greatest co-operative business ever floated. Conditions of Pharmacy changed rapidly in the beginning of last century; so much so that the great representatives of the art, Vauquelin, Soubeiran and others conceived of a central pharmacy of national importance, where drugs, chemicals and preparations could be obtained cheaply and of high quality. Testing of bought goods often cost them more in time than the goods themselves were worth, why not have all our goods tested at the Pharmacie Centrale by men doing this only?

But these dreams were premature. It took the great pharmacist Dorvault, fifty years later, to start the ball a-rolling, and it is rolling still. This great man said (how truly it also applies to our business): "The scarcity of students and obstacles of a material nature make it possible for a few pharmacists only to make all their preparations themselves. Without doubt it would be desirable to see the custom of the old pharmacy followed: that is, that all the compounded medicaments leaving a shop were really made therein. But greater and greater are the number of pharmacists that demand from the wholesale drug house those preparations that take time, or are difficult to make. Chemical products are becoming day by day more a part of the materia medica," etc. In other words, Dorvault, in his appeal to the pharmacists of France, complained that the pharmacist could no longer make his own preparations profitably; that making chemicals was even worse. He correctly goes on to state what little guarantee his brothers that bought goods from their then wholesalers had, so far as purity and the conformity to the Codex was concerned. Why should not the pharmacists make one great Pharmacie, in which each had stock and had a voice demanding that all must be made of high quality, that the Codex should be followed to the letter, and that goods sent out be standard—that is, tested. That stock could only be held by those who bought from the Pharmacie; in other words, Dorvault planned a co-operative company that was one in the strictest sense of the word. To-day the capital stock amounts to 10,000,000 francs.

The Pharmacie Centrale manufactures all preparations of the Codex; it deals in pure drugs and manufactures chemicals. Its stockholders can come and study in its laboratories, and it accepts

students who wish to follow the art. This grand idea that laid dormant more than fifty years till the man arrived, is a counterpart of the old professional pharmacy of 150 years ago.

In one pane the Pharmacie Centrale displays some pharmaceuticals, such as pills, perloids, minute seed-like pills of red and white tints, troches and other fine goods. In the second pane are their alkaloidal manufactures such as beautiful white silky quinine hydrobromate and hydrochlorate. Quinine dibromhydrate in heavy crusts, digitaline crystallized, in fact, a very nice display of alkaloidals of all kinds.

ALFRED H. ALLEN.

By Samuel P. Sadtler.

Alfred Henry Allen, F.C.S., well known to all chemists by his monumental work on "Commercial Organic Analysis," died July 14th, after an illness that appeared already ten years ago, and which he fought during that time, knowing that the malady in the end would conquer. Moreover, these ten years were among his most active; paper followed paper, volume followed volume, the work being broken only occasionally by journeys for his health to the South.

Allen began his career as a food analyst by serving as assistant to the late Dr. A. H. Hassall, well known by his work on "Foods and Their Analysis," and already in 1873 he was appointed as Public Analyst to the Corporation of Sheffield, and continued here in active practice until his death.

The Society of Public Analysts was founded by him in 1874, and whether as its President or on the Publication Committee of the *Analyst*, he was active in its service the remainder of his life.

He was one of the original members of the Society of Chemical Industry, founded in 1881, and active on its Publication Committee also until his death.

His great work, however, and by which he will always be most gratefully remembered by working chemists, was his "Commercial Organic Analysis," begun in 1879 and continued, volume for volume, through three editions down to the time of his death. This great work is an encyclopædia of working methods of prox

mate analysis and separations for organic compounds and mixtures of all kinds.

It is not a mere encyclopædia, however, in that it is an industrious compilation. It is, throughout, intelligently and discriminatingly written by one who either personally or by his assistants tried and proved every method, or where unable to do so the fact is clearly stated.

For chemist or pharmacist who does laboratory work outside of the narrow bounds of mineral analysis, the work is simply invaluable for reference and guidance. The last (third) edition was left unfinished at his death, but is coming out under the editorship of able workers like Dr. H. Leffmann and others.

Allen was a delightful personality and made many friends in this country, which he had visited several times. The writer met him first in 1884, when he visited Philadelphia at the time of the meeting of the American Association for the Advancement of Science. He was then eager to discuss new methods of analysis of organic products, and to visit manufacturing chemical works where he might learn something that would throw light on the problems he was looking into while writing his book.

The writer met him again on the occasion of a subsequent visit, and had correspondence with him and always found him the same eager inquirer. But he was not selfish in this; all he learned, whether by inquiry or by his own laboratory study, was freely given to the public in his "Commercial Organic Analysis," which he spared no labor to make as complete as possible.

He died at the relatively early age of 58, having achieved an honorable name in his profession, and left a grateful memory to all his many friends.

LABORATORY NOTES.[1]

By Frank X. Moerk.

Volumetric Estimation of Phenol.—In the process as usually followed, in which an excess of bromine v. s. is allowed to act upon the phenol in presence of hydrochloric or sulphuric acid, and titrating the excess

[1] Read at the twenty-seventh annual meeting of the Pennsylvania Pharmaceutical Association, June 21–23, 1904.

of bromine v. s. after the addition of potassium iodide with sodium thiosulphate v. s. with starch as indicator, the presence of the precipitated tri-brom-phenol interferes somewhat with the end-reaction; frequently in old phenol solutions the tri-brom-phenol possesses a bluish color which is not removable by an excess of sodium thiosulphate v. s. and which makes the end-reaction difficult. To overcome the difficulties mentioned I have recently been using a small quantity of chloroform (1 c.c. is sufficient), which is added after most of the brown color has been discharged by the addition of the sodium thiosulphate v. s.; the chloroform will dissolve the tri-brom-phenol and allow a very sharp end-reaction.

To those accustomed to making iodine-titrations in presence of chloroform it is needless to recall that the chloroform will dissolve and retain part of the iodine in solution, and that the sodium thiosulphate v. s. must be added as long as a blue color (due to the starch-iodide) is imparted to the aqueous supernatant liquid upon thorough agitation with the chloroform; in fact, it is possible to titrate without the use of starch-indicator, the end-reaction being known by a colorless aqueous solution and the chloroform free from any tinge of pink which is due to traces of iodine.

Any error caused by reaction between iodine and the chloroform can be compensated for by titrating the bromine v. s. with the addition of chloroform under precisely the same conditions as exist in this modified phenol determination.

Starch Indicator.—The deterioration of starch solutions has been the cause of much annoyance to those interested in analytical work. A large number of substances have been suggested as preservatives for starch solutions, but none of these are altogether satisfactory, and frequently the preservative is of such chemical character that the starch solution cannot be used for both qualitative and quantitative work.

Something over a year ago, as the result of a series of experiments which proved the above statements, the writer was led to try the action of oil of cassia as a preservative, influenced by a vague recollection of having seen some years ago a statement to the effect that oil of cassia had a remarkable preservative action upon some of the carbohydrates.

The experiment was a decided success, so that the solution made up in quantities of 1 liter could be used to the last drop. The starch

solution is made up in the usual manner, and after cooling 2 c.c. oil of cassia per liter of solution added and dissolved by agitation.

No objections have been noted to the use of this preservative in either qualitative or quantitative work, although the writer has been asked, on a few occasions, "Why our chlorine water smelled of cinnamon." The querists were using chlorine water in presence of the starch solution to make tests for hydrobromic and hydriodic acids, in which the odor of chlorine indicates when sufficient of this reagent has been added.

ANILINE COLORS AND SALICYLIC ACID IN ARTICLES OF FOOD AND DRINK.[1]

By Charles H. LaWall.

It would be impossible in a paper like the following to attempt to give a comprehensive account of the various methods used by analytical chemists in examining the innumerable substances which are brought to them for investigation, but there are certain substances whose presence in an article of food or drink absolutely brings it under the ban as far as the State food law is concerned, and the recognition and identification of which is a comparatively easy matter, even to one whose knowledge of analytical processes is very slight.

The so-called "pure food crusades," which are so frequently heralded by the newspapers and the trade journals, and which are made to serve as the target of many bad jokes, to say nothing of the malignant attacks to which those persons who are engaged in enforcing the laws are often subjected, are simply the occasional attempts on the part of the authorities of the State to enforce laws which are on the statute books, and which should be enforced all of the time if they are to have any salutary effect whatever.

There is no use in arguing the question as to the real harm in the prohibited substances, as it is, after all, not so much a question of the injury to health as a question of fraudulently manipulating inferior products so as to enable the seller to obtain the price of a much higher class of goods.

[1] Read at the twenty-seventh annual meeting of the Pennsylvania Pharmaceutical Association, June 21–23, 1904.

The cry of "salicylic acid" has so influenced the popular mind that many persons are under the impression that the substance in question is an injurious product of solely artificial origin, and that its physiological effect is but slightly less injurious than that of arsenic itself. It would no doubt surprise many of these persons to learn that an ordinary wintergreen lozenge contains as much salicylic acid (combined as methyl salicylate) as the average tumbler of jelly which has been preserved with this substance; but such is certainly the case, as any one who desires may verify for himself.

The presence of aniline colors and salicylic acid being most important then, from the standpoint of compliance with the food law, more prosecutions being based on these substances than on all others put together, many persons feel entirely safe from prosecution when assured of the absence of these products from the articles which they are handling, and it is the object of this paper to show the retail druggist how he can easily and effectually determine the presence or absence of these substances at least.

In looking for the presence of aniline colors in articles of food and drink, it will be remembered that the range of colors which it is customary to use is somewhat limited, being confined principally to the reds, yellows and browns, very few articles of this nature being colored either green or blue.

The first step in the operation of testing for the presence of aniline or coal-tar color is the selection and preparation of some fat-free woolen goods. For this purpose a good quality of nun's-veiling is obtained and freed from fat by boiling it, first in a five per cent. solution of sodium hydroxide for a few minutes, and then repeatedly in pure water until the alkali has been entirely removed. This material is then cut into strips of a uniform size (about 1 x 2 inches), and preserved in a wide-mouth, glass-stoppered bottle until it is to be used.

The material to be tested, if a liquid, is to be diluted with an equal volume of water; if it is a solid or a semi-solid it is to be dissolved in about four times its weight of water, and the liquid strained to remove particles of fruit pulp or cellular tissue, which would adhere to the wool and interfere with the results. About 100 c.c. (or 4 fluid ounces) of the liquid is placed into a beaker, 4 c.c. (or 1 fluid dram) of diluted hydrochloric acid (10 per cent.) is added, a single strip of the woolen goods is immersed in the liquid and the

contents of the beaker are then boiled for five minutes. The cloth is then removed, washed in cold water, and then boiled for five minutes in water which has been very slightly acidulated with hydrochloric acid.

If the coloring matter be of fruit or vegetable origin, the cloth will either be uncolored or will be changed to a very faint pink or brown tint. If coal-tar or aniline colors have been used, the cloth will be dyed a bright pink, red, yellow or brown, according to the color present. To confirm the results, remove the cloth from the acidulated liquid, wash it well in water, place it in a beaker with a little water and add a few drops of stronger ammonia water. Vegetable or fruit colors will not dissolve, but will change to a green, purple or yellow color. Aniline or coal-tar colors will not be changed in color, but will be dissolved, especially when the solution is heated to boiling; after which, upon the removal of the cloth, acidifying as in the original dyeing test, inserting a fresh piece of cloth and boiling as before, the color will again be deposited.

This second dyeing test is considered an absolute proof of the presence of added coloring matter, as no fruit colors have yet been found which will be deposited upon the wool the second time, while aniline colors will always be so deposited.

When cochineal is present a bright color is obtained with the first dyeing which might be mistaken for an aniline color; but when the ammonia water is added in preparing it for the second dyeing, the red color changes to purple, and the second dyeing comes out practically colorless.

In testing for salicylic acid, the material is to be prepared as in testing for coloring matter, except that it is to be acidulated with sulphuric acid instead of hydrochloric acid. After acidulating, about 50 c.c. (or 2 fluid ounces) of the liquid is placed in a tall cylindrical stoppered graduate (a tall cylindrical bottle will answer the purpose) and a layer of ether poured on the top (about one-fourth as much ether as the liquid to be extracted). The contents of the cylinder are then mixed by inverting it a number of times, taking care not to agitate the contents too violently, which would cause the formation of an emulsion.

After complete separation of the ethereal layer has taken place, about 10 c.c. (or 2 fluid drams) are cautiously removed by careful decantation or the use of a pipette, transferred to a watch glass, and the ether allowed to evaporate at a low temperature.

If salicylic acid be present in notable quantities the residue upon the watch glass will be distinctly crystalline; if but small quantities are present, the residue will have the appearance of small oily drops arranged in a circle near the circumference of the watch glass. The addition of a few drops of water and a drop of a dilute solution of ferric chloride (a dilute solution of ammonio-ferric alum is preferred by some) will develop the characteristic purple color of ferric salicylate, which is positive evidence of the presence of salicylic acid.

If a flesh-colored precipitate is obtained in this test instead of a violet coloration, it is proof of the presence of benzoic acid, the processes for the extraction of these principles being identical.

When the liquid which is to be tested for salicylic acid contains tannin, it will be necessary to change the preliminary manipulation somewhat, as tannin would be extracted by the ether, and thus obscure the ferric salicylate reaction. In cases of this kind, the liquid, instead of being acidulated with sulphuric acid at the outset, is treated with solution of lead subacetate, which precipitates tannin, coloring principles, etc. It is then filtered, and sufficient sulphuric acid is added to the filtrate to precipitate the excess of lead and render it slightly acid. After filtering out the insoluble lead sulphate the liquid is treated according to the foregoing directions.

AMERICAN PHARMACEUTICAL ASSOCIATION.

FIFTY-SECOND ANNUAL MEETING.

By M. I. Wilbert.

The fifty-second annual meeting of the American Pharmaceutical Association was called to order by President Lewis C. Hopp, in the Casino, at Kansas City, Mo., at 3.25 on the afternoon of Monday, September 5, 1904. After a short prayer by the Rev. Dr. Talbot, of Kansas City, the president of the local pharmaceutical association, H. Y. Riddle, welcomed the visitors to Kansas City on behalf of the local retail druggists, and then introduced the Mayor of Kansas City, the Hon. J. H. Neff, who welcomed the visitors on behalf of the citizens. Henry P. Hynson, of Baltimore, was asked to reply to the address of welcome made by the Mayor, and Joseph L. Lemberger, of Lebanon, Pa., responded to the address by Mr. Riddle.

After receiving the credentials of delegates from a number of national as well as State and local associations, the President, Lewis C. Hopp, Cleveland, O., read his address. This address was subsequently referred to a committee composed of F. W. Meissner, Laporte, Ind.; Fabius C. Godbold, New Orleans, La.; Chas A. Rapelye, Hartford, Conn.

Reports of committees were asked for. The Association then adjourned to select the several members of the Nominating Committee. In the subsequent report of the several States it developed that no less than twenty-eight States and Territories were represented by members present.

The reading of the minutes of Council precipitated considerable discussion as to the desirability of changing the official program. The amended program, recommended by W. C. Wescott, of Atlantic City, and seconded by Chas. Holzhauer, of Newark, N. J., finally prevailed. This recommendation provided for two extra evening sessions, so as to conclude the business of the Association on Friday evening in place of Saturday afternoon, and in this way secure an extra day at the St. Louis Fair for such of the members as were interested in that exhibition.

The official program, as finally adopted, was:

Monday, September 5th.

10.00 A.M. Council meeting.
3.00 P.M. First general session at Casino.
8.00 P.M. Reception to visitors, followed by dance.

Tuesday, September 6th.

10.00 A.M. Second general session.
3.00 P.M. Session of the Section on Commercial Interests.
8.00 P.M. Session of the Historical Committee.

Wednesday, September 7th.

9 30 A.M. Session of the Section on Pharmaceutical Education and Legislation.
1.00 P.M. Excursion to Fort Leavenworth.
8.30 P.M. Session of the Section on Practical Pharmacy and Dispensing.

Thursday, September 8th.

10.00 A.M. Second session of the Section on Pharmaceutical Education and Legislation.
2.30 P.M. Session of the Section on Scientific Papers.
8 00 P M. Dinner and dance at Elm Ridge Club.

Friday, September 9th.

10.00 A.M. Second session of the Section on Scientific Papers.

3.00 P.M. Second session of the Section on Practical Pharmacy and Dispensing.

8.00 P.M. Last general session.

In addition to the above program the local pharmacists had arranged an elaborate program of social events for the ladies and such of the visitors as did not care to take part in the scientific meetings.

On September 6, 1904, the meeting was called to order by President Hopp, in the Casino, at 10.45 A.M. After the reading of the minutes by the Secretary, Charles Caspari, Jr., Mr. Faxon welcomed the members of the Association on behalf of the N. W. D. A., and Wm. McIntyre, of Philadelphia, presented greetings from the N. A. R. D.

Several amendments to the by-laws were proposed.

The Treasurer, S. A. D. Sheppard, who is also a member of the Board of Trustees of the U.S.P., read a communication regarding the probable appearance of that book. This was received with thanks.

The election of officers for the ensuing year resulted as follows: President, Jas. H. Beal, Scio, O.; First Vice-President, P. C. Candidus, Alabama; Second Vice-President, Wm. Mittelbach, Missouri; Third Vice-President, Julius Koch, Pennsylvania; Treasurer, S. A. D. Sheppard, Massachusetts; General Secretary, Chas. Caspari, Jr., Maryland; Reporter on Progress of Pharmacy, C. Lewis Diehl, Kentucky. Members of Council, Joseph L. Lemberger, Pennsylvania; F. W. Meissner, Indiana; L. C. Hopp, Ohio.

The third and last general session of the American Pharmaceutical Association was called to order by the president, Mr. Hopp, on the evening of Friday, September 9th. After the presentation of greetings from the several delegates from various departments of the Government, the report of the Committee on the Time and Place of Next Meeting was called for. This committee presented a majority report for Atlantic City, N. J., and a minority report for Cambridge Springs, Pa. After some discussion the majority report was adopted.

The Committee on the President's Address, in its report, concurred in several of the recommendations made by the president. These were taken up seriatim and discussed.

The report of the Committee on Membership showed a total of 230 new members added since the meeting at Mackinac last year.

After the installation of the officers, for the ensuing year, the Association adjourned to meet in Atlantic City, N. J., on the first Monday in September, 1905.

SCIENTIFIC SECTION.

The Section on Scientific Papers held its first meeting in the Banquet Hall of the Coates House, September 8, 1904, at 2.30 P.M.

The chairman, Prof. W. A. Puckner, requested Chas. E. Caspari, of St. Louis, to occupy the chair while he read the recommendation of the committee of the section and presented his address.

The latter being printed he was, on motion, granted permission to present the same by title.

The Committee on Ebert Prize did not make any definite recommendations.

The report of the Committee on Drug Adulterations, through its chairman, E. H. Gane, of New York, included a number of suggestions and recommendations which if followed by practical and scientific pharmacists would tend to materially improve our drugs and chemicals.

The report of the Committee on Thymol Di-iodide Preparations, appointed last year, was read by Professor Kremers, who gave a résumé of the work, and the resulting figures as given by three independent workers. The resulting figures were then compared with those on the packages exhibited at Mackinac Island, and were found to differ very materially.

Considerable discussion, as to the proper course to be pursued to make amends to the several firms who had been wrongfully accused, followed. It was finally agreed to recommend the publication of the report with the ensuing discussion, in full, in the proceedings of the Association.

Following are the papers presented to this section:

THE RELATION BETWEEN CHEMICAL CONSTITUTION AND PHYSIOLOGICAL ACTION OF CERTAIN ORGANIC BASES.

By Prof. Ernst Schmidt, Marburg, Germany.

The above paper was presented and read by title.

Chemical Examination of Cascara Sagrada.

By H. A. D. Jowett, London.

This valuable and exhaustive paper was presented, in abstract, by the Secretary, E. H. Gane. It consists of a review and criticism of the work of previous investigators, and also embodies an account of numerous experiments that were made to determine, if possible, the active constituents of the bark.

Notes on the Pharmacology of Cascara Sagrada and Bitterless Preparations of Cascara.

By Burt E. Nelson.

This paper, also read by Mr. Gane, contains an account of some observations made with fractions of extracted cascara bark.

Balsam Copaiba.

By A. R. L. Dohme.

The author gave an abstract of a paper embodying a review of a systematic examination of a number of samples of balsam copaiba. Several of these samples were found to be adulterated with ordinary rosin (colophony); one sample labeled para balsam was grossly adulterated.

Aloes and Aloins.

By A. R. L. Dohme.

The author severely criticises a paper recently read before the New Jersey State Pharmaceutical Association that ostensibly embodied a ready method for preparing aloin.

The author also recounts a number of experiments that were made to determine the practicability of using Tschirsch's method of separating and purifying aloin.

Acetic Acid Fluid Extracts.

By A. R. L. Dohme.

The author believes that alcohol is, in the majority of conditions, a most important and desirable addition to medicinal fluid extracts.

The author also reports on a number of disadvantages that have developed to the systematic use of acetic acid in the making of fluid extracts; among others he cites the destruction of several of the active principles of crude drugs.

Fatty Oil of Mandrake.

By A. R. L. Dohme.

The author read a preliminary report on a thick, fatty oil found in some samples of mandrake, particularly in root that had been dug in the spring of the year.

The Introduced and Native Medicinal and Poisonous Plants of California.

By Albert Schneider.

An exhaustive treatise on the medicine plants of California.

This paper being too voluminous to be embodied in the proceedings of the Association, Professor Schneider agreed to furnish an abstract covering four or five pages, and to have the paper itself published elsewhere.

The session then adjourned.

On September 9th, 10 A.M., the second session of this section was called to order by the chairman, W. A. Puckner, after which the presentation of papers was continued.

The Alkaloid Calycanthin.

By H. M. Gordin.

The author records an exhaustive investigation into the physical, chemical and physiological properties of calycanthine, an alkaloid found in the seeds (achenes) of *Calycanthus glaucus*.

Epsom Salt.

By M. I. Wilbert.

This paper, accompanied by a number of samples, was designed to call attention to the frequently unnecessary admixture of foreign materials to magnesium sulphate and other heavy chemicals.

Cod-Liver Oil.

By J. P. Remington, Jr.

This paper, read by the Secretary, Mr. Gane, contains a discussion of the physiological and physical properties of cod-liver oil, and recommends that the oil be tested by pharmacists to insure purity.

Tests for the Purity of Cod Liver Oil.

By E. H. Gane.

Contains a description of a number of tests for cod-liver oil readily applied by retail pharmacists.

The Quinhydrone Hypothesis of Plant Pigmentation.

By E. Kremers.

This paper, presented in abstract by the author, embodies a study of plant pigments with a view of showing their probable relationship.

On the Curing of Leaf Drugs.

By R. H. True and Mr. Stockburger.

Presented by W. O. Richtmann, of the Bureau of Plant Industry.

The authors of this paper believe that leaf drugs are largely bought on their physical appearance. This appearance is, therefore, an important factor to be sought in this class of drugs.

The writers discuss the probable changes that take place in the coloring matter of plants, and also suggest methods of preventing undesirable changes in color in the drying of leaf drugs.

The report of the committee on the Chairman's address and on the report and recommendations of the committee of the section was then read by Professor Koch, of Pittsburg.

Chemical Reagents.

By Lyman F. Kebler.

This paper embodies the results of the analysis of a number ot chemical reagents supplied the Bureau of Chemistry, and emphasizes the importance of not depending on labels.

A Preliminary Report on the Presence of Nitrogen and Nitrates in Medicinal Plants.

By Lyman F. Kebler.

Contains a preliminary announcement of a proposed study on the economic value of the presence of fixed nitrogen in solanacecus plants.

Notes on the Methods of Detection of Adulteration in Olive Oil.

By L. M. Tolman.

This paper, presented by Lyman F. Kebler, contains a résumé of the most useful tests, at present available, for detecting common adulterants of olive oil.

Co-operative Work on Opium Assaying.

By Lyman F. Kebler.

This paper embodies an account of the results obtained by a number of independent workers, who were asked to analyze a sample of opium supplied by the Bureau of Chemistry.

Examination of Official Drugs.

By Daniel Base.

The author has examined 115 specimens, the majority of which were acceptable, conforming more or less closely to the demands of the U.S.P. But two of the drugs were found to be grossly adulterated—asafœtida and oil of wintergreen. Iodoform gauze was found to be deficient in iodoform, being but one-half the advertised strength.

The Determination of Codeine in Opium.

By Chas. E. Caspari.

The author describes, in detail, a satisfactory method for the determination of codeine in opium.

The Use of Potassium Biiodate for Standardizing Volumetric Solutions.

By Chas. E. Caspari.

In this paper the author records some observations made on the use of potassium biiodate for standardizing volumetric solutions of sodium thiosulphate, iodine, potassium permanganate, silver nitrate and alkalies.

The Need of Greater Care in the Testing of Clinical Thermometers.

By Caswell A. Mayo.

In this paper the writer records the varying results that were obtained by submitting the ordinary clinical thermometers to examination at the Bureau of Standards in Washington.

Saponin as an Emulsifying Agent.

By H. P. Hynson and H. A. B. Dunning.

The authors assert that from a practical point of view saponin is a very desirable emulsifying agent; whether or not it is sufficiently toxic to be objectionable or dangerous, is still an open question.

Sodium Bicarbonate in Iodometric Determinations.

By W. A. Puckner.

The author asserts that by using dilute solutions of sodium bicarbonate, saturated with carbon dioxide, more reliable results are obtained, in the volumetric estimation of phosphites by oxidation with iodine in presence of sodium bicarbonate.

After the installation of the newly-elected officers, E. H. Gane, New York, Chairman, and Chas. E. Caspari, St. Louis, Mo., Secretary, the section adjourned.

SECTION ON EDUCATION AND LEGISLATION.

The first session of the Section on Education and Legislation was called to order by the chairman, H. B. Mason, in the club-room of the Coates House, on Wednesday morning, September 7, 1904.

J. O. Schlotterbeck was requested to take the chair while the chairman read his address.

This address contains quite an exhaustive review of the present status of education and legislation directly affecting pharmacists.

Some exception being taken to the statement that the Illinois anti-cocaine law was a success, the chairman willingly accepted the correction and agreed to omit the reference to the Illinois law from his address.

Following the chairman's address the secretary of the section, Wm. L. Cliffe, of Philadelphia, presented a résumé of legislation that had been attempted or perfected during the past year in the several States and Territories.

The next order of business was the presentation of the final draft of an "Anti-Narcotic Law," by the committee appointed last year; this consisted of James H. Beal, C. S. N. Hallberg and E. G. Eberle.

After some discussion the draft as amended was endorsed by the section.

The present officers were renominated.

The following papers were then presented:

The Consolidation of the New York College of Pharmacy with Columbia University.

By H. H. Rusby.

This paper was read by title and referred to the Publication Committee.

The History of the Massachusetts Law Giving the Board of Pharmacy Supervision Over Druggists' Liquor Licenses.

By C. F. Nixon.

This was read, in the absence of the author, by Geo. M. Hoyt.

It embodies a historical sketch of the practical working of this law, from its enactment in 1894, some quoted opinions on the probable use of such a law, and also a copy of such portions of the statutes of Massachusetts as pertain to it.

Interstate Registration: Is it Practicable?

By W. R. Ogier.

This paper contains a number of valid reasons why reciprocity in pharmaceutical registration is impracticable at the present time.

The section then adjourned so as to allow members to join the excursion to Fort Leavenworth, provided by the local committee.

At the second meeting of the Section on Education and Legislation, held Thursday morning, September 8th, the following were elected as officers for the ensuing year:

Chairman, H. B. Mason, Detroit; Secretary, W. L. Cliffe, Philadelphia. Associates, F. B. Hayes, New York; J. T. McGill, Nashville; F. C. Godbold, Louisiana.

The first paper on the programme was:

What Degrees Should Be Conferred by Schools of Pharmacy?

By J. T. McGill.

The author reviews the degrees offered by the various schools at the present time, and deprecates the cheapening of academic degrees by conferring them on students whose professional education is limited to a short course in a few branches of science pertaining to pharmacy.

This paper elicited considerable discussion and was referred, for consideration, to a special committee and also to the conference of teaching faculties.

A Commercial Course in Colleges of Pharmacy.

By H. P. Hynson.

In this paper Mr. Hynson describes in outline the methods employed in the school with which he is connected, to instruct students in commercial practices. In connection with the paper he exhibited a set of books compiled by one of his students in the regular course.

The Consideration of Alkaloids in Schools of Pharmacy.

By W. A. Puckner.

The author discusses the desirability of discarding the teaching of isolated facts relating to alkaloids, and bringing out more prominently the relations of the alkaloids to ammonia and to the alkali metals in their chemical properties.

The Appreciable Advantages of Higher and Uniform Entrance Requirements to Colleges of Pharmacy.

By Albert Schneider.

In this paper Professor Schneider refers to the improvements that must necessarily result from the introduction of higher and more uniform entrance requirements to colleges of pharmacy.

The Requirement of Graduation from a High School Before Admission to Colleges of Pharmacy, and of Graduation from a College of Pharmacy Before Registration as a Pharmacist.

By J. H. Beal.

Professor Beal in this paper referred to the difficulty of suggesting a standard of entrance qualification that would be acceptable to all colleges of pharmacy until graduation from a college of pharmacy is required by law in all of the several States.

The Prerequisite Law in New York.

By Caswell A. Mayo.

The author outlined the provisions of the law recently passed in New York State, and referred to the history of the law and of the several provisions that it contains.

These three papers were discussed simultaneously. The discussion was rather spirited, and resulted in a motion to appoint a special committee to draw up or suggest a desirable prerequisite law that might prove acceptable in States without a board of regents.

Geo. C. Reimann, of the newly-organized association of State Boards of Pharmacy, made a short verbal report.

Food Legislation as Affecting Pharmacy.

By R. G. Eccles.

This paper was presented in abstract by the author, who asserted that food preservatives were not harmful, as was sometimes supposed.

Several additional papers were read by title, and the section adjourned.

SECTION ON PRACTICAL PHARMACY AND DISPENSING.

The first meeting of the Section of Practical Pharmacy and Dispensing was held on the evening of September 7th in the banquet hall of the Coates House.

In his address the chairman, William H. Burke, recommended to unite the Section on Practical Pharmacy and Dispensing and the Section on Commercial Interest, so as to obviate to an extent the growing multiplicity of sections. He also discussed the injustice accruing to Pharmacy in America from our present patent laws, and recommended that proper steps be taken to have them amended.

He advised pharmacists to keep in close touch with modern literature, and to strive to keep well posted on new remedies.

In speaking of prices on prescriptions, he recommended that the pharmacist should be allowed reasonable compensation for his efforts.

The report of the chairman of the National Formulary Committee, Prof. C. L. Diehl, precipitated considerable discussion.

It was recommended that alternative formulas be included in the coming edition of the National Formulary. This proposition was, on motion, adopted.

A motion to instruct the committee to include abbreviated or coined names was lost after considerable discussion, the opinion prevailing that the instructions already given the committee were sufficiently broad to cover any desirable changes.

On motion of Leo Eliel, duly seconded, it was recommended that the use of all or any portion of the text of the National Formulary be not allowed without adequate compensation. This was adopted.

DEVELOPING A PRESCRIPTION BUSINESS.
By Wm. A. Kirschgessner.

This paper contains a number of suggestions on how the prescription business of a drug store may be developed along profitable lines in a comparatively short time.

After considerable discussion the section adjourned at 12.30 A.M.

The second session of the Section of Practical Pharmacy and Dispensing was called to order by the chairman, Mr. Burke, in the

banquet hall of the Coates House, on Friday afternoon, September 9th.

The following papers were presented:

ELIXIR CARICA-PAPAYA.

By Wm. C. Kirschgessner.

Made by mixing two solutions as follows: (1) Alcohol, 120 c.c.; compound spirit of orange, 6 c.c.; syrup, 120 c.c.; mix. (2) Solution of potassa, U.S.P., 5·5 c.c.; water (hot), 240 c.c.; papain, 17 c.c.

NEW PRESCRIPTION FILE.

By M. I. Wilbert.

This paper contains a description and cut of a prescription file used at the German Hospital, Philadelphia.

SOME PREPARATIONS OF THE NATIONAL FORMULARY.

By Wilbur L. Scoville.

The author exhibited a number of specimens of preparations made from formulas that are proposed for admission into the new edition of the National Formulary, and discussed their relative merits.

CONTAINER FOR FLUIDS THAT TEND TO SPOIL WHEN EXPOSED TO AIR.

By E. H. Gane.

In this paper the author describes a copper container, made so as to stand a pressure of 20 pounds to the square inch and so arranged that it may be connected to a cylinder of carbon dioxide.

WAX IN SUPPOSITORIES.

By Wilbur L. Scoville.

The author recommends the use of spermaceti in preference to white wax, and believes that in moderate quantities it does not raise the melting point of the resulting suppository sufficient to be seriously objectionable.

SOME DISPENSING NOTES.

By E. A. Ruddiman.

This paper contains a number of practical points that will be of interest to the dispensing pharmacist.

AN ADJUSTABLE LABEL DRAWER.

By M. I. Wilbert.

The author gives a description of a box with open ends, used as a receptacle or holder for stock labels.

Pulvis Ventriculus Callosus Gallinaceus.

By Wm. C. Kirschgessner.

Contains directions for powdering chicken gizzards.

Elixir of Glycerino-Phosphate of Lime and Soda.

By Wm. C. Kirschgessner.

Contains a formula for this preparation.

Glycerole Acidi Hydriodici.

By Wm. C. Kirschgessner.

Contains a formula for this preparation, and also a list of some of the advantages that glycerine has over syrup in preparations of this kind.

Some Green Preparations, and How to Make Them.

By M. I. Wilbert.

The author suggests the possible use of distinctive colors as a desirable addition to well-known preparations, and also records some experiments he has made with the green coloring matter of hemp seed.

Conversion of Weights.

Three communications bearing on this subject were received by the chairmain and read before the section.

Some Points in Dispensing.

By H. P. Hynson.

The author gave a number of examples to illustrate the necessity of considerable technical knowledge to dispense what are sometimes classed as ordinary prescriptions.

Pillular vs. Powdered Extracts.

By Mr. Fisk.

The author recommends the making of uniform powdered extracts having a relative strength of 1 to 5 of the crude drug.

A number of additional contributions were referred to the Publication Committee for their consideration.

After the installation of officers—Chas. A. Rappelye, Hartford, Conn., Chairman; Wm. C. Kirschgessner, Grand Rapids, Mich., Secretary; Miss Stahl, Chicago, Associate—the section adjourned.

HISTORICAL COMMITTEE.

The meeting under the auspices of the Historical Committee was called to order by President Hopp in the club-room of the Coates House, on the evening of September 6, 1904. After a few preliminary remarks the report of the chairman, Edward Kremers, was called. This consisted largely of an outline report of the work that had been accomplished during the past year, and also contained a number of suggestion for work in the future.

S. A. D. Sheppard spoke of a scrap-book that he had prepared while local secretary for the meeting of the A.Ph.A. held in Boston, Mass., in 1875. This scrap-book contains practically a complete history of that meeting from the preliminary announcement to the reports of the meeting as published in the drug journals of that time.

Henry M. Whelpley, of St. Louis, referred to some material that he had collected in connection with the meeting of the A.Ph.A. in St. Louis in 1901, and also in connection with the semi-centennial meeting held in Philadelphia in 1902. In connection with this, Professor Whelpley exhibited a volume containing autograph replies to letters of invitation that had been sent to a number of men prominently connected with pharmacy in several parts of the world.

Professor Whelpley also showed a scrap-book containing a large number of photographs taken by him at the several meetings of the American Pharmaceutical Association that he had attended.

A. E. Ebert exhibited a number of letters written by the late Prof. Wm. Procter and also intimated that he was anxious to secure others if available.

WILLIAM PROCTER, THE FATHER OF AMERICAN PHARMACY.
By John F. Hancock, Baltimore.

In this paper the author described in outline the life and accomplishments of that eminent pharmacist. In this connection Mr. Hancock proposed that the American Pharmaceutical Association undertake the erection of a suitable monument in the grounds of the Smithsonian Institution at Washington.

THE CULTIVATION OF THE OPIUM POPPY IN THE UNITED STATES.
By W. O. Richtmann, Washington.

The author in the course of this interesting paper referred to the

several attempts that had been made in this country to cultivate the opium poppy and to produce opium.

Mr. Richtmann also referred to the several attempts to sell bogus opium in the United States.

HISTORICAL SKETCH OF THE PHI-CHI FRATERNITY.
By J. W. T. Knox, Detroit.

In the course of this interesting sketch it developed that this fraternity had its origin as a scientific society at the Michigan State University at Ann Arbor.

Mr. E. J. Kennedy, of the *Pharmaceutical Era*, New York, referred to a collection of "Druggists' Directories" that he had undertaken, and incidentally referred to some matters of historic interest in connection with them.

Prof. Wilbur L. Scoville, of Boston, presented a price list, published by the Massachusetts College of Pharmacy in 1854, and also spoke at some length of the history and evolution of that institution.

M. I. Wilbert, of Philadelphia, referred to the fact that, as yet, he had not received any Maisch letters, but was hopeful that the future would be productive of better results.

Mr. Wilbert also referred to a paper that he had presented on "The Beginnings of Pharmacy in America," in which he recounted some early practices in the dispensing of medicines and also records what little is known of the introduction of lectures on pharmacy in America.

Wm. McIntyre, of Philadelphia, presented a copy of the menu of the banquet held in connection with the meeting of the American Pharmaceutical Association in St. Louis in 1871.

It having been proposed to develop the Committee on Historical Pharmacy into a regularly organized section it was moved that the chairman of the committee be asked to confer with the committee on the president's address with a view of establishing a Section on the "History of Pharmacy."

On motion it was also proposed to appoint a committee of three to confer with the managers of the Smithsonian Institution, or the National Museum, with a view of having established in either of these institutions a national pharmaceutical museum.

Several additional papers were read by title, among them:

"The Founding of the Lloyd Library," by J. U. Lloyd; "The

Drugs of Primitive Peoples;" "The Rites Observed in the Collection of Camphor by the Borneo Head Hunters;" "Pharmaceutical Notes from Cummins' Tour to the West," by Edward Kremers.

After the regular business had been dispensed with M. I. Wilbert exhibited a number of slides of early drug stores in Philadelphia.

SECTION ON COMMERCIAL INTERESTS.

The section on commercial interests was called to order in the Casino, on the afternoon of September 6th, by Robert C. Riley, the Secretary, who read a letter from W. L. Dewoody, the Chairman, presenting his regrets that he was unable to attend. In the absence of Mr. Dewoody, Chas. R. Sherman, one of the associates, was requested to take the chair.

PAY TELEPHONES OR DEADHEAD TELEPHONES.

By John I. Straw, of Chicago.

The principles involved in this paper were discussed at some length by several of the members present. In the course of the discussion it developed that in some of the cities of the Middle West pharmacists have been enabled to make quite satisfactory arrangements with the telephone companies.

THE DEFICIENCY IN THE SUPPLY OF ASSISTANT PHARMACISTS AND THE NECESSITY FOR A LONGER PROBATIONARY PERIOD.

By Jas. H. Beale, of Ohio.

Professor Beal believes that the present scarcity of drug clerks is largely due to the fact that the probationary period, according to the State pharmacy laws, is altogether too short.

DEPARTMENT ACCOUNTS.

By H. P. Hynson, of Baltimore.

In which the author gave, in outline, a description of a system of accounts that may be applied to the wants of retail pharmacists.

PRICES AND QUALITIES OF CHEMICALS.

By Lyman F. Kebler.

The author discussed the probable relation that the prices quoted on chemicals usually bear to the quality of the chemicals as supplied.

The election of officers for this section resulted as follows:

Chairman, Chas. R. Sherman; Secretary, R. C. Riley; Associates, Mathias Noll Acheson, Frank H. Carter, Oscar W. Bethea.

EDITORIAL.

THE INTERNATIONAL CONGRESS OF ARTS AND SCIENCE.

Whatever may be said of the scope and purpose of the Louisiana Purchase Exposition, it must be admitted that the International Congress of Arts and Science, held under its auspices, was most successful, not only in the attendance, but also in the character of the work done. The Congress was well managed, and as a result was attended by a very large number of the most eminent leaders of thought. During the six days of meeting, from September 19–24, 128 sectional meetings were held, in which there were at least two principal addresses, these being followed in some cases by brief communications.

It appears that the idea of an international congress originated at the Paris Exposition in 1889. This was followed by the World's Congress Auxiliary at the World's Columbian Exposition, held in Chicago in 1893, and by that of a series of congresses held at the Paris Exposition in 1900. In all these congresses the main object was to bring together the most eminent men of the world to discuss the results already attained in their respective fields of research. The Congress in St. Louis was more comprehensive, the purpose being to have an assemblage " at which leading representatives of theoretical and applied science shall set forth those general principles and fundamental conceptions which connect groups of sciences, review the historical development of special sciences, show their mutual relations and discuss their present problems."

It is doubtful if such a gathering of eminent men of science was ever held before. Perhaps the mention of a few of the names of those who were in attendance will verify this statement. Of the some ninety foreign scientists and men of letters present we mention: Prof. Wilhelm Ostwald, University of Leipzig; Prof. Henri Poincaré, of the Sorbonne, Paris; Sir William Ramsay, of the Royal Institution, London; Prof. Henri Moissan, of the Sorbonne, Paris; Prof. J. H. Van t'Hoff, University of Berlin; Prof. Svante Arrhenius, University of Stockholm; Prof. Hugo de Vries, University of Amsterdam; Prof. F. O. Bower, University of Glasgow; Prof. Karl F. Goebel, University of Munich; Prof. Julius Wiesner, University of Vienna; Prof. Oskar Drude, of the Kön. Technische Hochschule, Dresden; Prof. Oskar Hertwig, University of Berlin; Prof. Max Verworn,

University of Göttingen; Prof. Ronald Ross, School of Tropical Medicine, University College, Liverpool; Sir Lander Brunton, London; Sir Felix Semon, Physician Extraordinary to His Majesty, the King, London; Prof. Theodore Escherich, University of Vienna.

There were over 400 American men of science and letters who took an active part in the meeting. We select the names of a few, viz.: Prof. Josiah Royce, Harvard University; President Woodrow Wilson, Princeton University; President William R. Harper, University of Chicago; President Ide Wheeler, University of California; Prof. Francis A. March, Lafayette College; Prof. John W. Mallet, University of Virginia; Prof. A. B. Prescott, University of Michigan; Prof. W. O. Atwater, Wesleyan University; Prof. Russell H. Chittenden, Yale University; Prof. Edward C. Pickering, Director of Harvard Observatory; Dr. Abbott L. Rotch, Blue Hill Observatory; Prof. William G. Farlow, Harvard University; Prof. C. O. Whitman, University of Chicago; Prof. William K. Brooks, Johns Hopkins University; Prof. Frederick W. Putnam, Harvard University; Dr. Edward C. Spitzka, New York City; Prof. William Osler, Johns Hopkins University; Prof. William T. Sedgwick, Massachusetts Institute of Technology; Dr. George M. Gould, Philadelphia; Prof. Abraham Jacobi, Columbia University; Prof. Michael I. Pupin, Columbia University; Prof. Liberty H. Bailey, Cornell University; Hon. William T. Harris, U. S. Commissioner of Education; President Arthur T. Hadley, Yale University; Prof. Hugo Muensterberg, Harvard University.

At the opening meeting of the Congress, addresses were made by President Francis, of the Louisiana Purchase Exposition; Dr. William R. Harper and Dr. Frederick J. V. Skiff, members of the Administrative Board of the Congress; Prof. Simon Newcomb, President of the Congress, and the several Vice-Presidents of the Congress.

All of the addresses and communications in each department will be collected and published in a special volume.

Any one who attended, day after day, this "six-day Autumn school," as it was termed by Professor Muensterberg, could not help but catch the prevailing note of the Congress, as expressed by Professor Harper in his address on the opening day, viz., the unification of knowledge. "Let us," he says, "confidently assure ourselves

that the great purpose which has throughout controlled in the different stages of its organization will be realized; that because the Congress has been held the nations of the earth will find themselves drawn more closely together; that human thought will possess a more unified organization and human life a more unified expression."

THE SOCIETY OF CHEMICAL INDUSTRY.

The annual general meeting of the Society of Chemical Industry was held for the first time outside of the British Isles, in New York City, beginning September 7th. The meeting was unique in one respect, in that only one address was made and that by the retiring President, Sir William Ramsay. The rest of the time allotted to the meeting was devoted to entertainment and sight-seeing, which was probably well in view of the intellectual feast afforded the members later at the International Congress of Arts and Science, for here chemistry in its various branches was most ably represented and most valuable papers were read.

An interesting feature of the meeting in New York was the presentation of the Barnard gold medal of the Society for research in applied chemistry to Professor Ira Remsen, president of Johns Hopkins University. It is also gratifying to know that the newly elected president of the Society, W. H. Nichols, is an American. Mr. Nichols is one of the foremost electrical chemists of the United States.

In his address before the Society, President Ramsay took for his theme "The Training of the Chemist." He touched upon some vital points in educational work and for this reason we give a brief abstract of his address:

This education should primarily consist in an effort to produce an attitude of mind, rather than to instil definite knowledge; to cultivate the inventive faculty, though, of course, a vast amount of knowledge will be gained during the process of training.

Anticipating the objection that it is not possible to create an inventive mind, he pointed out that most of the young men who enter a chemical laboratory do so from choice; and the choice is due, in most cases, to the existence in their minds of a germ of the power of research and suggestion, which needs development and cultivation.

In considering the best method of cultivating this power Professor Ramsay recommended the force of example; inculcating the doc-

trine that every teacher in the laboratory should be engaged in research, and should be willing to discuss the problems upon which he is engaged; it is thus that a "chemical atmosphere" can be created. In order that the students shall gain as much as possible from each other, the various departments of chemistry should not be walled off. The best instruction which a student can get, he acquires in having to explain his operations to his neighbors. Hence inorganic, organic and physical students should work in the same room, and care should be taken to intermingle seniors and juniors.

One advantage of this system is that the lesson is soon learnt to judge of a man's capacity by his achievements rather than by his knowledge. Mechanical accomplishments are by no means to be despised. Every man should become a glass-blower by imitation and by trial; not by direct instruction; the mechanical operations of soldering, repairing, joiner's and brass work are learned without direct teaching.

A fairly good student should have gained such powers in one and a half or two years as to be able to help himself in facing an analytical problem which he has not previously attempted. By mixing research students with others at all stages of advancement, the man who is working at analysis insensibly gets to regard his operations as partaking of the nature of a problem, and pursues his work with greater interest. It is possible, with a little ingenuity, to make routine analytical work partake more or less of the nature of a problem; and the junior student's analytical skill may often be utilized for purposes of research, in helping more advanced students with their work.

Professor Ramsay emphasized the fact that in many cases the student is overtaught. But it may be said that if he is allowed to struggle on, his progress will be painfully slow. "Yes; possibly at first. But the ultimate rate of progress is much more rapid. Unless the pupil learns to be of use to himself, he cannot possibly be of use to others. The training consists in finding out how to do it; not in doing it; that is easy, if one knows how."

Passing on to the junior staff, it was insisted that at least half the time of assistants should be their own. It is unjust to treat assistants as mere teaching-machines; their advancement depends on their becoming known; and their becoming known involves publication of the results of their work. It should also be part of the

duty of assistants to suggest and superintend the working out of problems set to students; in this way, he is apprenticed to his trade.

As the number of assistants must necessarily be greater than that of professors, and as assistants should, as a rule, be birds of passage, it follows that some should be drafted off into industry. As in Germany, so our manufacturers would find it to their advantage to induce assistants from University laboratories to enter their works.

It is not possible for any man to supervise the work of more than forty or fifty men, even if he is well provided with assistance. The reason why the laboratories of Liebig, Wöhler and Bunsen were regarded with such loving memory by their old students is that the total number of students was small, and each came under the influence of the great teacher. Too much time, also, should not be spent by the professor in the duties of organization. If too many students flock to any one laboratory, let a new one be built, and a new chair be created.

Professor Ramsay next considered the question of remuneration, and pointed out that if first-rate men are to be tempted to choose a university career, the prizes to the most successful should bear comparison to those gained by the successful physician, lawyer or manufacturing chemist. It is not necessary that all should be paid at such rates; but if some are not, the teaching profession will fail to attract, and second-rate men will fill university chairs.

The subject of examinations was next touched on; and stress was laid on the danger of an examination being so contrived as to elicit what a man knows rather than what he can do. The danger of scholarships reaching the wrong men, and their award fostering wrong aims, was also alluded to.

A question sometimes debated is whether the professor should lecture to junior or to senior students. The object of a course of lectures is to open out a subject, and to direct a student how to read, rather than to give definite information. Students are generally much overlectured; and it is doubtful whether lectures should be continued in a formal manner for longer than the first two years of the student's career. But, as some learn best through the eye, and some best through the ear, it is advisable to make use of both channels of approach to the brain, at all events in beginning each division of chemistry. Lectures on technical subjects appeared to the speaker to be futile.

The last part of the address was devoted to the consideration of a possible association which should fulfil a double function—that of giving a practical training to future technical chemists, and that of encouraging invention.

NATIONAL PHARMACEUTICAL ASSOCIATIONS.

During the months of August and September, three national meetings of special interest to pharmacists were held, viz.: the thirty-third Annual Conference of the Deutscher Apotheker-Verein, at Hamburg ; the forty-first Annual Meeting of the British Pharmaceutical Conference, at Sheffield ; and the fifty-second Annual Meeting of the American Pharmaceutical Association, at Kansas City.

The meeting in Hamburg was held in connection with an exhibition of chemical and pharmaceutical products and apparatus, and was attended by representatives from Austria-Hungary and Holland. The meeting was in the main devoted to the consideration of the education of pharmacists and to pharmaceutical legislation.

The question of the educational requirements was brought up on behalf of the council by Dr. Bedall. The government examination, which became operative on October 1st, requires a "prima" grade of certificate as a condition of entrance to pharmacy; whereas the Society had previously sought the introduction of the "maturum" grade. A resolution was submitted to the effect that it was the sense of the meeting that the requirement of a "prima" grade of certificate was only a temporary provision, which would soon be followed by the requirement of a certificate of a gymnasium or a real gymnasium.

The meeting of the British Pharmaceutical Conference must be voted a success. The presidential address of T. H. W. Idris on "A Year's Progress in Pharmacy," showed that the speaker had the best interests of British pharmacy at heart. There were some fifteen papers presented, most of which elicited a considerable amount of discussion, and some of these we hope to abstract later on.

It will be seen from the account of the proceedings of the American Pharmaceutical Association, published elsewhere in this number, that the Association is alive to the best interests of American pharmacy.

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FOOD PRESERVATIVES.

By Henry Leffmann.

In the active prosecutions that have been undertaken within the past few years for the suppression of food adulteration, a conspicuous feature has been the antagonism to some preservatives. The preservation of food by artificial means is a necessity of civilized life. Some methods have been used from a very early period. Among these are cooking, drying, smoking, salting and pickling. Of less importance, because of limited applicability, are freezing, spicing and sugaring. Mankind resorted to all these methods long before the chemistry and physics of the processes of fermentation, putrefaction and decay were known, and the date and manner of discovery of the older methods are unknown to us. Indeed, the history of the development of exact knowledge in this respect is within the memory of many living persons.

The progress of organic chemistry has resulted in the discovery of several substances of marked antiseptic quality and comparatively little toxicity. The best-known examples are formaldehyde, salicylic acid, benzoic acid and the naphthols. One inorganic substance, boric acid, has also been found suitable for antiseptic purposes. These substances are eminently adapted, from the manufacturing point of view, to the preservation of food. They are cheap, and, in the amount needed, give no color, odor or appreciable taste to the material. Each substance has its preferable applications. Thus boric acid (including borates) is adapted to the preservation of meat and milk; salicylic and benzoic acids to fermentable articles, such as fruit juices and jellies.

When the authorities charged with the active prosecution of food-adulteration began their work some years ago, in different parts of the United States, they found some of the above-mentioned preservatives in extensive and comparatively long-established use. The question as to wholesomeness at once arose. It was met by different authorities, as might be expected, in different ways. Some have assumed that all preservatives of ancient origin are safe, and all of modern origin are unsafe. Acting on this decision, some officials have established the broad forbidding of all preservatives except salt, vinegar and wood-smoke; others have permitted limited use of boric and benzoic acids and their sodium salts. Salicylic acid has been generally prohibited.

It cannot be said that these distinctions in permission are founded upon a scientific basis. The experimental data are not extensive, and are somewhat one-sided; the investigations have been made with the modern, or, as they have sometimes been called, chemical preservatives. If we accept freely the published results, we can say, I think, merely that a limited amount of disturbance of function may be attributed to the most used of the modern antiseptics.

The question, in my opinion, cannot be considered as placed on a scientific basis until all forms of preserved food have been studied carefully in comparison. It is probable that all forms of preserved food are less wholesome than fresh. Even the cooking of proteid-foods diminishes their digestibility. Drying, salting, smoking and pickling have probably still more unfavorable effects. Experiences among those who make long journeys away from the comforts of civilization, who must rely on food preserved in any manner, show amply that fresh materials have some special nutritive quality that is not long retained. This fact is abundantly exemplified in the history of navigation, and in recent experience of Alaskan pioneers.

The action of certain authorities in placing the older preservatives on a permissible list and the newer ones on a forbidden list is purely arbitrary. It has been, in most cases, done without scientific bases; indeed, in some respects, in defiance of the known data. Certainly, with regard to salicylic acid, Kolbe's long experiment on himself should receive consideration. It is true that experts can be easily secured who will express opinions unfavorable to a given article, but this counts for nothing; experts can be found ready to give opinions either way.

In this State convictions have been obtained in several cases upon the principle that if it can be shown that the preservative is poisonous in any dose, it is to be considered a poison absolutely, and its use contravenes the law. It seems to me that this sets at nought the whole science of pharmacodynamics. The question whether or not a substance is a poison is one of dose. No substance is absolutely a poison. If we adopt the interpretation of a term that is advocated by some authorities, many articles of food will come into the category of injurious substances and their use could be forbidden. Vanillin, caffeine, citric acid are all capable of producing disturbances of function when taken in large amount or continuously, yet as taken in common beverages they are generally regarded as wholesome. Even the old-established preservatives would go down under this system. Acetic acid, upon which the preservative action of vinegar depends, is one of the most corrosive substances known; wood-smoke owes its preservative quality to creosote and its analogues, also highly corrosive. The truth is, the definition of a poison must involve the questions of dose and manner of administration. Hydrogen sulphide, for instance, is actively toxic in one form of administration and not so in another.

We have lately had in this city an interesting instance of the peculiarities of expert testimony, when it depends on mere opinions rather than inferences for actual experiment. The food authorities of Pennsylvania not long ago forbade the sale of vegetable articles colored with copper, because this metal was regarded as dangerous. Dr. H. W. Wiley, in a public lecture last winter, deprecated the sale of such articles, although not definitely declaring the metal poisonous. Since that time experts in another bureau of the Department of Agriculture have been active in declaring that copper is quite harmless, and several Philadelphia physicians have been supporting this view. One set of experts tells us that copper cannot be allowed in appreciable amounts in any food article; another set, equally eminent and equally positive, tells us that it is entirely harmless in drinking water. Who shall decide when doctors disagree?

What data are there to show that salt is entirely harmless in food? What proof have we that sodium benzoate is more objectionable than the ingredients of wood-smoke?

HOW FOOD PRESERVATIVES AFFECT THE PUBLIC HEALTH.

By R. G. Eccles.

Every intelligent man is an advocate of pure-food laws and of their enforcement. To advocate the use of preservatives in food is to advocate in behalf of pure food. Perishable foods subjected to delay in other than cold-storage transportation, or delay in packing in the absence of cold storage, cannot reach the consumer in a pure state if preservatives are not used. Food may reach the consumer relatively pure and not remain so until consumed. Scarcely a month passes that somebody is not reported killed with impure food and dozens have been seriously injured by it, and always because that food did not contain preservatives. To stop this incessant slaughter of innocent people is the object of advocates of preservatives. They want to see the market supplied with food that will not kill and maim. They are confident that for every reported case of virulent ptomaine poisoning there are a hundred mild cases never heard from. Meat, fish, beans, catsups and sausages, with many other kinds of foods, are constant carriers of impurities which sacrifice human lives and cause continuous suffering to multitudes. Such impure food looks well, tastes all right, smells as if fresh, and in every way appears to be good, but it kills. It is in a condition of incipient decay, and not in that extreme form of decay which is detectable. The spores of deadly microbes remain harmless until a little warmth nurses them into vitality. The heat we call comfortable for a room is all that is needed to develop their danger. Let there be no ice in the house, or let the maid leave the food out of the refrigerator for a short time, and human lives are sacrificed.

Delays in reaching cold storage, or in reaching the packers, when no ice is available, permits a first crop of spores to grow and be sown over the food. Delays in putting left-over provisions into the kitchen refrigerator develop the poisons along with a second crop and whole families are maimed or killed. If carriers of perishable foods, instead of being forbidden by law to use preservatives on such foods, when they are delayed and cannot be hurried into a refrigerator, were compelled to use these agents *before* decay had a chance to start, there would probably be fewer deaths from ptomaine

poisoning. Unless the public demanded more, none but delayed goods would require the use of preservatives, and they would be added *before* the food had had a chance to begin its decay. In consequence of such treatment it would reach the market in a perfectly fresh and safe condition. Such food could be marketed as preserved food and left to the law of the survival of the fittest to settle its fate. Legislation that forbids this sort of saving of food threatened with decay puts a premium on deception and encourages packers and others to put upon the market goods that appear all right, but that are laden with death and suffering. They throw away the least deadly, because no one will buy it, but they sell the most deadly, because they know that even food experts cannot tell but that it is all right. Somebody knew that it was delayed away from refrigeration, and could have saved its slaughter of human beings but for vicious law.

"But," you ask, "are not preservatives harmful?" What if they are? No living being dare assert that they ever did the harm that decayed food has done. Because they might do a little injury, is that any reason why they should not be permitted to save hundreds of lives? What injury have our most frequently-used preservatives ever done? Can you find a single recorded case of a human being having been injured by preserved foods? No one has yet succeeded in finding such a case. Salicylic, benzoic and boric acids, with their salts, have been in use for over twenty years, and no one can point to the record of a single person having been maimed or killed by any article of food containing them. Thousands have been killed and thousands more tortured through having used food that should have been, but was not, protected by these chemicals. Has it ever occurred to you to ask the grounds upon which the opposition to preservatives is maintained? Do you know that in all the swearing in our courts by witnesses against preservatives, it is done on purely theoretic grounds? Do you know that the theory is an old one of a generation ago, that no living authority now dares to maintain? Let me quote a statement from the words of a man who is an American leader in this war against preservatives: "There is no preservative which paralyzes the ferments which create decay that does not at the same time paralyze *to the same extent* the ferments that produce digestion. The very fact that any substance preserves food from decay shows that it is not fit to

enter the stomach." (Bull. 100, Ky. Agr. Exp. Sta., p. 101.) According to that, and it is from the highest authority of the opposition, the better a preservative preserves, the more dangerous it is to human beings. On the strength of this assumption they fight preservatives, call them poisons, and denounce them as injurious to health. They have no experimental evidence as yet of the truth of such a claim, but are trying now to get it. The theory, in their case, preceded their experiments. All men of science know what this means.

I wish to particularly divert your attention to the use of the word "ferment" by the authority I have quoted. He uses the word in two distinct and *unlike* meanings. On this blunder he draws his conclusion. The ferment of decay and the ferment of digestion are related to each other just as much as the sugar of lead is related to the sugar of milk, or the oil o vitriol is related to the oil of cottonseed. Indeed, the difference is far greater in the ferment case than in either of the others. Our ignorant fathers confounded the living germs of putrefaction with the chemical substances we call enzymes, just as they confounded sulphuric acid with oils and acetate of lead with sugars. No one is now so ignorant as to reason that what is true of oil of vitriol must be true of oil of peanuts, or what is true of sugar of lead must be true of sugar of milk. The State and national leaders of the opposition to modern preservatives do not blush over confounding ferments with enzymes and drawing conclusions from such confusion. They would think a country rustic should blush for his ignorance if he should reason that because oil is an excellent application for the hair, he should proceed on the strength of such logic to apply oil of vitriol to his hair. They talk glibly of *paralyzing* the ferments of digestion, which are *dead chemical substances*, because they may be permitted to speak of paralyzing living germs. They do not hesitate to draw the conclusion that this paralyzing (?) of enzymes, unfounded as it is, is proof that our bodies are injured, *i. e.*, poisoned, by preservatives. Let us test such logic: "Hydrochloric acid will paralyze the ferments that create decay. Hydrochloric acid must, then, *to the same extent* paralyze pepsin, the ferment that produces digestion. The very fact that hydrochloric acid preserves food from decay shows that it is not fit to enter the stomach." Could mortal man reason worse than this? I need not stop to tell intelligent pharmacists that if

hydrochloric acid paralyzed (?) the ferments of digestion, and if it did not enter our stomachs, we would all soon be dead men. If such logic was sound, there would not be a living man or vertebrate animal on this earth. Yet, this is the kind of reasoning that has led to the swearing in court that salicylic acid is dangerous to health and a poison. It has had men fined and has wrecked many a substantial and useful industry in this and other countries. It is threatening you pharmacists to-day with fines and imprisonments. Salicylic acid has been chosen as the special target of attack because, as the author of the above reasoning elsewhere says, "on account of its cheapness and activity it may be called the universal preservative" (lecture on "Living a Hundred Years," *Chicago Record*, verbatim report, February 28, 1901). Its methyl ester is found in hundreds of plants from the most diverse botanic orders. Most fruits contain it. Nature has thus put it into our food. In this respect it is like benzoic acid. I defy any one of them, if he likewise dares to claim that vinegar is *not* a poison, to put the matter to the test of a public experiment with me. If vinegar is a poison, then the Judge's ruling makes it a crime for any person to add vinegar to any kind of food in this State. Will the commissioner be consistent and just? Will he punish with fines every person who is selling pickles or mustard, catsup or relishes, because they contain vinegar? The acid of vinegar in its pure state is, according to the best authorities in therapeutics, *eight times stronger* than salicylic acid in its pure state. Is it just to punish the men who use the weaker substance and permit those who use the stronger to escape unscathed? If the commissioner doubts the testimony of works on therapeutics as regards the comparative toxicity of these two substances, will he test the matter experimentally? I will begin with a grain of salicylic acid at a dose. After I have taken it, let him then take a grain of the *pure* acid of vinegar. Let us each day increase our doses by an extra grain, and continue till one or other of us cries "enough!" In this way the substances can tell their own tale. If salicylic acid is a poison, then the acid of grapes, the acid of lemons, the acid of all kinds of fruits, the acid of sauer kraut, and the acid of vinegar *must* one and all be called poisons. They are all pronounced stronger than salicylic acid; not by one standard work on therapeutics, but by *every such book* published in the world that I have been able to consult.

In their strongest condition, boric, benzoic and salicylic acids are *much weaker* than multitudes of substances used daily in our foods when they are concentrated. Take the essences; many of them are far more potent. Take the spices; they, too, are more potent. Take mustard; it is immensely more potent. Take the phenols of smoked meats and fish; they are much more potent. Take the flavors of butter, of all kinds of fruits, of cheese, and some of them are so vastly more toxic that there could be no comparison between them. Apply the Judge's charge to his jury to all of these and where would we be? No one dare sell butter, cheese, mustard, pepper, apples, pears, grapes, bananas, pies, cakes, ice cream, candies, any fruit, any bread containing fruit, any article containing a flavoring ingredient, etc. In fact, he would close the market upon nearly everything that civilized man wants to eat. What a blessing it is that some men are not consistent. Just the same, however, the Judge has established a precedent that makes every dealer in almost every kind of pastry, confectionery, dairy products and fruits, violators of the laws of the State of Pennsylvania.

Prior to the census of 1900 your commissioners allowed you freedom. As a result, the vital statistics of that census gave your State a favorable showing. In Minnesota, Michigan, Wisconsin, Illinois and the Dakotas no such freedom was permitted. These States forbade and punished all who used such preservatives. If you care to take the trouble to look up the statistics of the results, you can find them on page ccxxvi of Vol. III, Part I, Twelfth Census of the United States. On that page you will find a table giving the death rates in all parts of the United States from diseases of the digestive system. As this kind of diseases comes from poisonous germs in food and drink, you can see how applicable the study of such a table is to this discussion. There you will learn that in grand groups 19 and 16 the death rates were *far higher* than in any of the remaining groups. On pages cviii and cix it will be seen that these grand divisions are made up of the States where the commissioner's present methods were tried before the census and are still being blindly pursued. The region that gives the lowest rate is a region of factories where the dinner pail is the ice-box, and where without preservatives their food could not keep till consumed. The major-

ity of the people there are too poor to afford an abundance of ice, and must buy considerable food that will keep without it. If the commissioner's methods continue till the next census is taken, I will watch with extreme interest to see if the results agree with those of the last.

THE THEORY OF INDICATORS AND ITS BEARING ON THE ANALYSIS OF PHYSIOLOGICAL SOLUTIONS BY MEANS OF VOLUMETRIC METHODS.

By G. H. A. Clowes, Ph.D.
Gratwick Research Laboratory, University of Buffalo.

(*Continued from p. 467.*)

VI. USE OF INDICATORS IN TITRATION OF NORMAL STOMACH CONTENTS.

From the results recorded above, bearing in mind the fact that the end point of an indicator is dependent entirely upon the state of equilibrium of the substances present in the solution, it must be concluded that the differences observed between the different types of indicators in conjunction with normal stomach contents is attributable, in the first place, to the nature and quantity of nitrogenous bodies present. In other words, whilst the absolute end point obtained with any given indicator may be a function of the acid or acids present, the range from the lowest end point, phloroglucinvanillin drops, for example, to the highest, phenolphthalein or Porrier's blue, for example, is almost entirely dependent, in the first place, upon the amount of nitrogenous bodies present, and in the second place upon the extent to which the bodies in question have been hydrolyzed with the liberation of basic groups capable of combining with hydrochloric or other acids to form weak salts. Each individual period between indicators may be attributed more or less to the influence of varying types of amine groups; from those which in virtue of their union with carbon, to which only hydrogen is bound, may be looked upon as extremely positive, to those lying in close proximity or directly attached to a CO group, which possess, according to their position in the molecule, either very slight positive or even neutral to negative characteristics. It cannot

be said that any given period is a direct function of any given type of combining nitrogenous group, for the end points of certain indicators are more delicate than those of others. If stomach contents were purely a mixture of hydrochloric acid with nitrogenous bodies possessed of basic affinities varying in strength from that of ammonia to that of the NH_2 group in urea, then the final end point should be a gauge of the total hydrochloric acid and the difference between the final and intermediate end points should be dependent upon the quantity and degree of hydrolysis of the nitrogenous products in question. But this is not the case. Phosphates, organic acids and other substances present in small quantities interfere to an appreciable extent with results and must be allowed for.

In the course of the last two years some 250 stomach contents have been examined after a variety of test meals, that of Ewald being employed by preference. In certain cases estimations were carried out on unfiltered materials, but generally they were first filtered and then titrated with a series of indicators. Total chlorine was estimated by adding an excess of alkali, ashing and determining volumetrically with silver nitrate and potassium sulpho-cyanate; chlorine present as salts estimated by ashing directly, igniting and determining volumetrically, the difference representing hydrochloric acid free and combined and any ammonium chloride that may have been present in the original stomach contents. The phosphates were estimated volumetrically by the method described in a previous publication, the neutralized stomach contents being evaporated, ashed, ignited, ammonia removed by boiling with alkali and carbonic acid by boiling with acid, the difference between the alizarin and phenolphthalein end points affording an accurate estimate of the effect attributable to phosphates. Total nitrogen was determined by the Kjeldahl process, as was that present in the phosphotungstic filtrate obtained on precipitating 10 c.c. of stomach contents with 10 c.c. of 20 per cent. solution of phosphotungstic acid containing 2 per cent. of sulphuric acid. Lactic and other organic acids when present in sufficient quantities to produce an appreciable effect were estimated separately.

In the large majority of normal cases the phenolphthalein end point, after allowing for the influence of phosphates, was found to afford a fairly accurate estimate of the total available hydrochloric acid in the stomach contents; that is to say, hydrochloric acid, either

free or combined with proteids.[1] In a series of abnormal cases, the majority of which were cancer, this was not found to be the case, large differences amounting to as much as 6 and 8 c.c. for 10 c.c. of stomach contents being accounted for only partially by the lactic acid separately estimated. In certain of these cases one is forced to the conclusion that some secondary decomposition of proteids has led to the liberation of carboxylic groups, such as that present in aspartic acid, for example, groups which, as was shown in Section IV, are capable of producing an effect upon alizarin or phenolphthalein; also the weaker type, similar to that present in asparagin, glycocol, leucin and tyrosin, which are capable of exerting an influence on Porrier's blue. This effect of liberated carboxylic groups may be recognized in another manner. If artificial peptic

TABLE III.

Case.	1	2	3	4	5	6	7	8	9	10	11	12
Free and combined HCl	7·7	11·1	9·0	9·4	8·0	5·6	7·1	3·6	2·6	4·1	6·6	6·4
Total phosphates	Nil	Nil	1·5	·6	·3	·4	·8	·8	·4	·4	·2	·6
Sum	7·7	11·1	10·5	10·0	8·3	6·0	7·9	4·4	3·0	4·5	6·8	7·0
Phenolphthalein end-point	7·6	10·9	10·6	9·6	8·0	5·9	8·3	4·5	2·8	4·6	6·6	7·1
Difference	—·1	—·2	·1	—·4	—·3	—·1	+·4	+·1	—·2	+·1	—·2	+·1

digests of pure proteids be allowed to run for four, twenty-four and forty-eight hours, respectively, care being taken to maintain exactly the same conditions of working, and to prevent evaporation of water, it will be found that whilst the hydrochloric acid and total nitrogen in the mixture have remained perfectly constant, as would be anticipated, the phenolphthalein end point has increased, the alizarin probably slightly diminished, and the drops' end point considerably diminished, indicating an extension of the range of titration from the phloroglucin drops' end point to the phenolphthalein end point, due, presumably, to the liberation of basic groups on the one hand, which are capable of affecting the drops' end point and not the phenolphthalein end point, and on the other hand of carboxylic groups capable of affecting the phenolphthalein and not

[1] See fifth annual report New York State Cancer Laboratory.

interfering with the drops. It may, however, be said that a marked variation between the phenolphthalein end point, after allowing for phosphates and the gravimetrically determined total available hydrochloric acid, is seldom to be recorded within three or four hours from the commencement of the process where normal peptic digestion is concerned.

A long series of determinations of total nitrogen and of nitrogen in the phosphotungstic filtrate in comparison with the figures obtained on volumetric titration with phloroglucinvanillin drops, alizarin and phenolphthalein has failed, as would be expected from the above, to show any close relationship. After correcting the differences between the end points of drops and alizarin, alizarin and phenolphthalein end drops and phenolphthalein, for the effect due to phosphates and other secondary causes, the widest variation is

TABLE IV.

Case.	1	2	3	4	5	6	7	8	9	10	Avg.
Alizarin to Phenolphthalein	25	19	30	26	43	31	17	31	21	35	—
Phosphates	4	2	5	4	5	4	1	5	3	5	—
Difference	21	17	25	22	38	27	16	26	18	30	24·0
Total nitrogen	113	107	131	120	228	135	80	127	104	144	128·9
Phosphotungstic filtrate	23	19	23	27	40	26	18	24	19	27	24·6

still found to obtain in the ratio of these figures to the total nitrogen and phosphotungstic nitrogen. The range from alizarin to phenolphthalein is generally from a fifth to a sixth of the total nitrogen, as is the phosphotungstic nitrogen. The range from drops to alizarin varies far more, and that of drops to phenolphthalein may be anything from a half to a tenth of the total nitrogen, but it may be said that where the digestion is advanced, the titration range is higher in proportion to the total nitrogen, and that the highest relative figures are obtained in those cases in which secondary decomposition is well marked. The results of this nature have usually been confirmed by finding discrepancies between the volumetric and gravimetric estimation of chlorides. Both these factors may be taken to indicate the probable liberation of amido and carboxylic groups having a specific effect upon the state of equilibrium of individual indicators. That the phloroglucinvanillin end point actually

represents the end point of free and totally dissociated hydrochloric acid may be proved by determining the osmotic pressure of the stomach contents in a fresh state, after neutralization to the drops' end point to the alizarin end point, and to the phenolphthalein end point. In the first period up to the drops' end point the osmotic pressure cannot be found even approximately by summing those of its constituent solutions, a simple calculation showing that free hydrochloric acid has been neutralized by soda, thus forming only two ions and a slightly dissociated molecule in the place of four. After the phloroglucinvanillin end point, the determinations of the freezing point indicate a reaction between ammonium chloride or some similar body and soda, which, as would be anticipated, fails to result in as large a diminution in the osmotic pressure as is observed in the first portion.

The observation that the phosphotungstic filtrates obtained from peptic digestion mixtures may reach very considerable proportions in spite of the absence of leucin, tyrosin and all final products of disintegration of proteids, must be attributed, in all probability, to the presence in the mixture of derivatives of these mono-amido acids possessing at least twice as large a complex. It is very probable that this particular mono-amido acid grouping, even in relatively complex molecules, may lead to a differentiation of those compounds possessing it from those possessed of di-amido acid grouping, which are precipitated by phosphotungstic acid.

The results obtained with artificial peptic digestion mixtures and normal and pathological stomach contents may be summarized as follows:

(1) In a normal peptic digestion that has only been allowed to run three or four hours after a purely proteid or an Ewald test meal (and allowing for the effect of phosphates and carbonic acid), the phenolphthalein end point gives an accurate estimate of the total available hydrochloric acid present in the stomach, either free or combined with proteids.

(2) The end point to drops of phloroglucinvanillin gives a fair estimate of the actual free hydrochloric acid.

(3) The range from phloroglucinvanillin drops to the phenolphthalein end point, after allowing for phosphates, is a function of the proteids present in the mixture and the extent of their hydrolysis or decomposition.

(4) This range increases with advancing digestion or decomposition as does the phosphotungstic nitrogen, the total nitrogen and chlorine remaining approximately constant.

VII. TITRATION OF TRYPTIC DIGESTION PRODUCTS.

A series of digestion experiments, making use of the extracts of pancreas and duodenum of human beings and animals which were carried out with a different purpose in view, were utilized to determine the effect of successive stages of pancreatic digestion on the end points of indicators. Whilst a constant quantity of sodium carbonate was present in each digest, the proportions of pancreatic extract and duodenal extract were permitted to vary within wide limits. Constant weights of egg-white and plantose, a vegetable albumen, were employed, and the period during which they were submitted to the action of digestive ferments varied from four to forty-eight hours. In order to economize space it has been found necessary to omit the tables, but it may be said that in each case, with increasing concentration or extension of the time of action, an increased quantity of nitrogenous products brought into solution was invariably accompanied by an equivalent increase in the total range of titration from phloroglucinvanillin to phenolphthalein, the influence on the period from phloroglucinvanillin to alizarin being more marked than that from alizarin to phenolphthalein. It was also observed that after a constant amount of nitrogen was obtained, owing to the proteids being entirely in solution, further digestion resulted in a still further increase in the titration range, the phenolphthalein end point requiring slightly more alkali or less acid, and the phloroglucinvanillin end point more acid than previously. After allowing for the influence exerted by carbonic acid and other known causes of interference, it may be said that in an advanced stage of digestion the range of titration is frequently almost equal to the total nitrogen; certainly in excess of one-half, indicating a more advanced stage of disintegration than was observed in peptic digestion experiments.

VIII. ON THE CONSTITUTION OF PROTEIDS.

In the course of the last twenty years an immense amount of research has been devoted to the solution of the problem of the constitution of molecules of various types of proteids and simpler

nitrogenous bodies. Kühne, Chittenden, Hofmeister, Kossel and their students, as well as numerous other investigators, have attempted to arrive at a clear understanding of the way in which the molecule is built up, breaking it down by means of various reagents until simple, readily recognized bodies were obtained; and estimating the proportions of such bodies with a view to arranging a possible molecular complex which would include them all. Fischer, on the other hand, has devoted his attention principally to the problem of synthetically producing bodies possessing the characteristics of proteids from their elements by building them up, principally through condensation of amines of the type of glycocol and its derivative glycyl-glycin, the resulting bodies possessing properties very similar to those of the natural peptones. Osborne has separated pure specimens of a large number of these nitrogenous compounds derived from the proteids, but possessed of a simpler complex, and yet far more complicated than the final products of disintegration (leucin, tyrosin, etc.), and by preparing the hydrochloric acid salts of such bodies as edestin, arrived at conclusions regarding the probable molecular weight.

Paal was the first who attempted to throw light on the nature of the proteids, albumoses and peptones by preparing the compounds which they form with bases and acids. By analyzing the preparations obtained in this way at various stages of digestion this investigator attempted to draw conclusions not only regarding the absolute size of the molecules of the various compounds isolated, but also regarding the various more or less resistant portions of the original proteid molecule subjected to hydrolysis. Paal observed that hydrolysis of a complex molecule to form two simpler molecules, indicated by the increase in osmotic pressure of the mixture, was generally associated with an equivalent increase in the ability to take up hydrochloric acid. This indicates the probable liberation of an NH_2 group in the ordinary process of hydrolysis. It appears, however, extremely probable that by means of suitable indicators it should be possible to estimate not only the total number of such NH_2 groups present in the molecule, but also to differentiate between the different types that may possibly be formed varying from those possessed of extremely basic to those possessed of almost neutral or even acid characteristics. In a recent publication dealing with the products of decomposition of certain

proteids, Osborne and Harris estimated the percentages of ammonia and so-called basic and non-basic nitrogen, the two latter being differentiated by the fact that amido bases are precipitated by means of phosphotungstic acid, whilst the amido acids are passed through into the filtrate.

In carrying out comparative series of experiments on the nutritive value of certain animal and vegetable albumens, we have frequently noted far greater variations in the alizarin end points than in those of phenolphthalein and phloroglucinvanillin on titration, and this is of especial interest taken in conjunction with Osborne's work on the fractionation of the products of decomposition of certain proteids referred to above, for it must be remembered that whilst phloroglucinvanillin is sensitive to almost all the NH_2 groups that could eventually be liberated from a union similar to that existing in glycylglycin, alizarin is only sensitive to ammonia and those amine groups which are possessed of fairly strong basic characteristics, and phenolphthalein only slightly to ammonia, as was seen in a previous section of this article.

It is highly probable that the range of the various periods between the titration points of the different indicators in the course of peptic or tryptic digestion may prove, when worked out, to afford valuable indications regarding the type of combination which each individual, freshly exposed amid group may be said to possess; whether, for example, it is associated exclusively with carbon, to which only hydrogen is attached, or to what extent it is removed from CO groups, or whether it is present in the form of an acid amid. Unfortunately time does not permit of our carrying this question further. We should merely wish to emphasize the value of volumetric methods of titration in following the progress of various digestive processes, and any reaction in which the hydrolysis of proteids or less complex nitrogenous compounds is concerned. The small amount of work already carried out in this direction makes it appear probable that such a method of procedure, when taken in conjunction with osmotic pressure and other physico-chemical determinations, may be expected to throw some light on the methods of grouping of the various atom complexes presesent in different types of proteid molecules.

From analyses carried out by Dr. Wheeler in the laboratory it appears probable that each advance in the digestive process is

accompanied by a very appreciable increase in the titration period lying between the drops and alizarin end points representing in all probability the liberation of weak basic NH_2 groups presumably on hydrolysis of a union of the type — CH_2 — NH — CO — present in glycyl-glycin and other compounds of a similar type investigated by Fischer. The action of any hydrolyzing agent would leave the group — CH_2 — NH_2 free to combine with any available acid possessed of sufficient strength until equilibrium were established. The period from alizarin to phenolphthalein which very probably represents a stronger NH_2 group, remains much more constant until an advanced degree of decomposition is reached, at which point it increases, but not in the same proportion as does the other period. Taking the total range of titration from drops to phenolphthalein, from drops to alizarin, from alizarin to phenolphthalein, total nitrogen and phosphotungstic nitrogen, it will be seen that as the disgestive process advances all other quantities increase in proportion to the nitrogen, the period from drops to alizarin more rapidly than that from alazarin to phenolphthalein.

It is interesting to note that the range from alizarin to phenolphthalein compared with nitrogen varies from 1 : 18 to as low as 1 : 3 or 4, which is in agreement with the findings of Paal. This investigator prepared compounds which were practically HCl salts of the products of proteid hydrolysis, and from his analyses it may be calculated that the acid equivalent varied in proportion to the nitrogen from 1 : 18 to 1 : 2, passing from relatively complex albumoses to the simplest obtainable peptones. This is in agreement with the findings of Latham, Lieberkühn and others, who have given the soluble albumoses a formula containing 18 atoms of nitrogen. Osborne, in determining the acid-combining equivalent of his crystalline proteid edestin, found two distinctly differing combining capacities, one which was 1 : 144 and the other 1 : 72, showing in all probability one weak and one strong basic group free to form combinations with acids.

IX. BLOOD SERUM.

A series of comparative titrations of the blood serum gives average results recorded in Table III, which are based on the effect exerted by 1 c.c. of clear, separated serum towards a variety of indicators. It will be seen that a fairly uniform result is obtained

with different varieties of serum, all of them being slightly acid to phenolphthalein, requiring from ·1 to ·2 c.c. of n/10 solution; and alkaline to alizarin, requiring from ·4 to ·6 c.c.; strongly alkaline to phloroglucinvanillin drops, the end point varying from 1·2 to 1·6. The total nitrogen of the serum appears to be about five times the total range from phenolphthalein to the drops' end point. The end point of Porrier's blue lies slightly below that of phenolphthalein, and the precipitation point of proteids appears to coincide fairly well with the end point of alizarin or to lie slightly beyond. The effect of phosphates is not large enough to account for the titration differences, giving an average of ·2 from the phenolphthalein to the alizarin end point and ·2 from the alizarin to the drops' end point. It is therefore apparent that the proteids themselves play an important role in affecting the end point of given indicators. The variations from the normal observed in human beings under pathological conditions will be dealt with in another publication.

TABLE V.

Indicator or Reagent.	Guinea Pig.	Rabbit.	Bullock.	Hog.	Antitoxic Horse Serum.
Phenolphthalein	+ ·1	+ ·1	+ ·1 to ·2	+ ·05 to ·1	+ ·1
Alizarin	− ·5	− ·6	− ·4 to ·5	− ·65	− ·7
Drops	− 1·2	− 1·45	− 1·4 to 1·5	− 1·55	− 1·6 to 1·7

The wide variation between the end points of the three indicators employed above on titrating blood serum, emphasizes the necessity of establishing certain uniform standards when determining the degree of alkalinity of blood serum in pathological cases. To avoid confusion when titrating blood serum from cases of diabetic coma or cancer cachexia, it has been customary in this laboratory to determine the end point of the indicators enumerated above, as well as that of lakmoid, which seems to have been fairly extensively employed for this purpose.

X. TITRATION OF URINE.

The discussion of this subject, so far as pathological conditions are concerned, will be reserved for another publication, but it may be remarked that under normal conditions the urine is about equally acid to phenolphthalein and alkaline to alizarin,

and it may be said that some serious disturbance in the metabolic equilibrium has taken place when urine is either acid or alkaline to both alizarin and phenolphthalein. In other words, since the passage from alizarin to phenolphthalein represents the neutralization of the second acid group of phosphoric acid, the excreta of the kidneys cannot be said to be satisfactory unless the first acid group of the phosphates is entirely neutralized by bases and the third entirely free, the end point lying somewhere between the neutralization points of the first and the second.

The presence of small quantities of amido bodies (lying between ammonia and urea in basic properties) could not produce a very appreciable effect upon indicators in comparison with the large amount of phosphoric acid present in the urine, and it is consequently not a matter of such importance to determine their influence as was the case in dealing with stomach contents, serum, etc.

In the presence of any considerable quantity of ammonia, which, in contradistinction to urea exerts a powerful effect upon alizarin and phenolphthalein, the urine would be less acid, or even alkaline to phenolphthalein and more strongly alkaline to alizarin than is normally the case.

In conclusion the writer wishes to express his indebtedness to Dr. David E. Wheeler, by whom a considerable number of the analyses referred to in this paper were carried out.

XI. SUMMARY.

In this paper the physico-chemical theory of indicators has been discussed in so far as its principles are found to be applicable to the solution of problems involved in the volumetric analysis of physiological solutions.

Practically all indicators are sensitive to strong acids and strong bases. They may, however, be divided into three distinct classes when tested with a series of weak acids and weak bases of the type present in physiological solutions. At one end of the scale are those which in virtue of an extremely weak acid affinity are particularly affected by weak acids and are, comparatively speaking, indifferent to weak bases; whilst at the other end of the scale are to be found those which are possessed of strong acid or weak basic combining groups which render them very susceptible to the influence of weak bases but more or less indifferent to that of weak acids.

It is further possible to differentiate between a series of two or more acids or bases present in the same solution provided one can find indicators, the combining affinity of which to form neutral salts lies intermediate between those of the bodies to be titrated. A good illustration of this mode of differentiation is the recognition of the three acid groups of phosphoric acid, the first one of which coincides with the first alizarin end point, the second with the second alizarin end point, or with the phenolphthalein end point, and the third with the phenolphthalein end point in the presence of barium chloride; or aspartic acid, for example, the first acid affinity of which is neutralized at the alizarin or phenolphthalein end point, the second only at the end point of Porrier's blue. Carbonic acid affords an interesting contrast to aspartic acid, neither of its acid groups being strong enough to affect alizarin, one only giving an indication with phenolphthalein and both with Porrier's blue. It will thus be seen that in their behavior towards phenolphthalein and alizarin we have a sharp differentiation between the strongest acid affinities of aspartic and carbonic acid respectively.

At the other end of the scale phloroglucinvanillin is sensitive to the amido group present in aspartic acid, and entirely indifferent to the acid groups referred to above. Whilst Porrier's blue is absolutely indifferent to ammonia and all weak basic groups, alizarin is sensitive to ammonia, but not to amido groups of the type present in glycocol, leucin and tyrosin. Phloroglucinvanillin as an indicator gives a sharp titration of NH_2 groups of this class, and one of the NH_2 groups in asparagin. It is unaffected by the second or amido group of asparagin, and those of the same type present in acetamid, formamid, urea, etc.

In discussing the effect of albumoses, peptones, etc., on indicators, it was shown that perfectly pure preparations of these substances show a wide range of variation in titration end points, attributable presumably to the influence of weak basic groups present in the molecule; further, that in advancing hydrolysis the range from the lowest to the highest end points was increased, and that this effect cannot be attributable to the influence of phosphates, organic acids and chlorides to the same extent as has been generally supposed.

The comparison of volumetric with gravimetric analyses of normal and pathological stomach contents showed that provided a plain Ewald, or, by preference, a purely proteid test meal were employed,

and the materials examined in the space of three hours, with very few exceptions the phenolphthalein end point gives a fairly accurate estimate of the total available hydrochloric acid present in the stomach, either in a free state or combined more or less feebly with proteids. The influence exerted by phosphates is usually small, and may be allowed for by making a separate estimation of the quantity present according to a method suggested by the writer in a previous paper. The end point of phloroglucinvanillin drops used on a warm plate gives a fairly accurate estimate of the actual free hydrochloric acid. The range of titration from the phloroglucinvanillin end point to that of phenolphthalein, after allowing for the influence of phosphates and traces of organic acid may be said to be a function of the basic affinities of proteids and their decomposition products present in the solution. The total range and the end points of intermediate indicators are dependent upon the total quantity of such bodies present in the solution and the extent of their hydrolysis or decomposition, and provided comparable conditions of experiment are employed this range may be said to be fairly proportionate to the peptic activity of the mixture.

Under pathological conditions, where hydrochloric acid is absent or diminished in quantity, and peptic digestion fails to take its normal course, especially where organic acids have been produced under the influence of bacteria, the above rules are no longer applicable. The total range no longer bears the slightest relationship to the titration results; chlorides determined gravimetrically are found to be far below the phenolphthalein end point; the nitrogen present in so-called phosphotungstic filtrate rises above the normal, which is from 20 to 25 per cent. of the total nitrogen in a well-digested mixture. All these factors point to the abnormal breaking down of proteids beyond the point normally reached in peptic digestion in the stomach, presumably under the influence of bacterial enzymes functioning in a neutral solution with the liberation of additional weak basic and acid groups, as the result of the abnormal hydrolysis.

In tryptic digestion due allowance must be made for the influence of a known quantity of sodium carbonate, which may be estimated independently. Both the acid groups of this body are capable of exerting an influence upon Porrier's blue, whilst only one affects phenolphthalein, and other indicators, such as alizarin or phloro-

glucinvanillin, are entirely unaffected. After allowing for the influence due to carbonic acid, it is found that the range of titration increases with increasing digestion, being at the early stages more or less proportionate to the amount of proteid brought into solution as estimated by the total nitrogen, but subsequently increasing in undue proportion to the total nitrogen as digestion proceeds, with the formation of simpler nitrogenous products.

The bearing which work of this nature may have on the solution of certain problems connected with the constitution of proteids and their decomposition products was also discussed. Titrations of normal blood serum showing a wide variation with different indicators which could not possibly be attributed to the inorganic constituents of the serum were tabulated and the necessity of an agreement upon certain specific indicator end points for serum titration emphasized.

The titration results on urine were shown to be fairly dependent on the amount of phosphates present, the small proportion of amido bases and weak acids present exerting a relatively small effect in normal cases. A normal urine should be acid to phenolphthalein and alkaline to alizarin, the end point lying somewhere between the neutralization points of these indicators. In other words, whilst the first acid group of the phosphates should be neutralized, the third acid group should remain free, varying proportions of the second group being neutralized or not, according to the state of equilibrium of the system. Naturally, in the presence of any considerable quantity of ammonia which in contradistinction to urea exerts a powerful effect upon alizarin and phenolphthalein, the urine would be less acid, or even alkaline to phenolphthalein and more strongly alkaline to alizarin than is normally the case.

In conclusion, a plea must be raised for the establishment of a more accurate standard of titration of various types of physiological solutions, definite indicators with definite end points being employed, so that the work of various investigators may be in some sense comparable, in order that the results of volumetric analyses may have their scientific value when used in conjunction with the more exact gravimetric and physico-chemical methods, which can scarcely be said to possess as wide an application.

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PHARMACY AND CHEMISTRY AT THE WORLD'S FAIR.

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(*Continued from p. 474.*)

V. THE PHILIPPINES: A LAND OF PROFESSIONAL PHARMACISTS.

When old Tom Benton, of Missouri, said, "There to the west, there lies India," he little thought that when a half century had scarcely rolled away, the great railroad he then opened for the benevolent assimilation of the commerce of India would be carrying American soldiers on conquest bent to the bloody swamps of glory, malaria and mosquitoes of the Philippines—a country whose men, customs, climate and products are as mysterious and wonderful as the most impossible tales from India's jungles; a land whose people are small of stature and intelligent, but with as much of the old Adam to the running foot as any people on the face of the globe; islands where the gentle zephyrs of the typhoon waft the deep and continued rumblings of the quaking earth far out to sea. Fortunately there was enough left after all the natural and unnatural acts of nature and man during the past ten years to bring to St. Louis one of the grandest displays of the Fair, a collective exhibit worthy of an empire.

The Philippine Commission, in addition to showing the many naked and half-naked tribes of the islands in separate villages, have large separate buildings, namely: *Agriculture*, implements and

products. *Forestry*, woods, resins, roots and barks. *Education*, university, college and primary-school work. *Art*, wonderful paintings and drawings by native artists. *Household Arts*, knitting, etc. *Commerce*, sugar, leather, alcohol, wines and cigars. There are features in the general exhibit that may interest the individual visitor, such as the war exhibits and the like.

What will especially interest Americans is the Philippine way of doing things. In front of the large Agriculture Building are the many crude wooden plows, harrows, rollers carrying wooden spikes, sugar presses, hemp and rope-making appliances, all typical of the old agricultural methods of the Gauls and Romans. The spirit that pervades the farmers is that some day we will use American plows, but these are good enough for us. Especially interesting is the oil press exhibited. Imagine a square frame of heavy timbers, the upper having a central and longer opening than the lower cross piece; into these openings wooden timbers slip, leaving little play in the lower opening. The thus formed open jaws are tightly forced together by two wedges driven into the upper opening behind the jaws. Cocoanut, sesamé oil and the like are made by the natives with such presses; the press cakes are used as stock feed.

The juice of the cane is expressed by vertical rollers; one roller being connected with the motive power, the carabao, by a long timber swinging about the focus in a large circle. The other rollers are connected by teeth arrangements working in corresponding openings in the motive roller. The three-roll presses, made of stone and hard wood, move thus in unison. The tall two-roll presses have spiral-thread arrangements carved in the wood for some two feet at the top, thus insuring the necessary motion of both rolls. As the presented cane stalk would slip up and down the roll when presented by the indolent workman, a wooden timber having more or less of a rounded wedge-shape with a tunnel through the center, takes the presented stalk. The juice running down the rollers is collected in pans or tubs. This is then carried to the evaporating pans; the one shown is of iron, 1 meter across and $\frac{1}{3}$ meter in depth. When the farmer finds the syrup becoming of such consistency that it becomes solid on cooling, he pours it into earthenware pots holding probably 10 gallons. These pots look like buckets; the walls are about $\frac{1}{3}$ inch in thickness. In this form, pilones, the husbandman sends his crude sugar of deep-brown color to the refiners in Manila

and the villages in the interior. All qualities of sugar, for the most part of brownish tint, are shown in this Agriculture Building.

Indigo receives attention in the islands; while the plant grows in temperate regions, here it yields three crops a year against one crop in the more northern lands. The leaves and stalks are gathered before the fruit appears and expressed. The yellowish juice passes through greenish and blue shades, when the indigo separates out an insoluble powder. Thirty hours usually suffices for this change. The samples of indigo shown are of very fine appearance, made into the usual cylindrical forms.

There are a number of flour-bearing plants in the islands. Harina de maiz is our familiar corn meal. The yucca and many palms yield flours, though rice forms the great staple. The mortars in which rice is beaten into powder are varied. The idea underlying many of the wooden mortars is to imitate a boat. In the center a round hole is gouged out. In this wooden mortar the rice is placed and contused with wooden mallets or wooden pestles. Many very formidable mortars are shown, also small hand affairs holding little more than a thimbleful. Some wooden mortars of larger size are hollowed out of the upright trunk. Burrstone mills are also made by the natives, the rice being fed through the top stone, which has a small hole leading to the grinding surfaces.

The most noted starchy food next to rice is the pith of the *buri* palm. This grows on all the islands, is graceful; its fruit is not edible. Cutting down the tree the pith is removed; placed in tanks, the acrid bitter juice drains off; it is then dried and pounded in mortars, the starch now separates as a fine flour. This preliminary draining off of acrid juice is necessary in very many other instances, *e. g.*, making cassava.

The Commerce Building should not be overlooked. It houses the tobacco, fermenting, fiber, distilling, leather and paint industries. The case of Ilang Ilang oil will be the most attractive, though small, for it furnishes the perfumer with the Eastern attar of rose. This oil is obtained from the yellow flowers of Ilang Ilang tree; the blossoms are exceedingly fragrant, some 3 inches long. A tree will often yield 800 pounds of blossom during the year, 75 pounds yielding a pound of the oil, costing in the market some $50, so we see the distilling of this oil is not unprofitable when you consider the tree thrives wild and also is readily planted and cultivated. The

flowers are distilled with water from a common still. The distillate of oil and water separates into two layers, the lower being the oil. This is tapped off, filtered through talcum and furnishes a water-white first quality oil. The last runnings are more yellowish in tint and have a slight smoky odor. B. Largado, of Manila, shows some 10 pounds of the various grades.

The Spanish naturally never forget tobacco. Here are all qualities of leaf and cigars, cigarettes and the like. The most striking is the manner in which the finest quality are sent into the trade. Each box looks like a chemical laboratory; it is filled with test tubes tightly corked, each test tube containing a single cigar.

The firm of Ynchausti & Ca., Tanduay, Manila, are extensive makers of alcohol, spirits, liqueurs, rhum, etc. The alcohol shown is water-white, of first and second quality. Caña is the name of alcohol made from sugar cane. Ron is rhum. The exhibit is very elegantly gotten up.

We have read of the deadly crazing "vino" that many of our troops attacked with gusto and were sent home in a pitiful condition. Palms are many in the islands; sweet juices may be extracted from the flowers. Fermenting, distilling and the like, a powerful intoxicant results. Many wines of this kind, gins, true wines, moscatels and beers make up a large portion of this exhibit.

The Forestry Building boasts many beautiful slabs of timber. Slabs from a single tree 10 feet across and many feet long are common. Of exquisite color, weight and hardness, these trees furnish the best of wood for the carpenter.

The collection of barks, roots and resins used medicinally number into the thousands. We may say that there are, if anything, too many. It is simply bewildering to see the wealth of drugs furnished by the Philippine forests.

Of resins there are several hundred; also, in many cases, the latex is shown. Probably a ton of one single resin, that known as *alamaciga*, obtained from *Agathis canarium*, testifies to the importance of this branch of forestry. This resin is in enormous lumps, many being over 6 inches through. The resin is hard, of pale yellow to brown tints, and quite translucent. It is still in the original Philippine package, long knitted bags of thin willow or other wood thongs; the mesh averages 2 inches. This resin comes in the class of dammar, kauri and other hard resins. It makes good varnish.

A mound some 10 x 10 feet at the base makes a very effective display of gutta-percha balls. These balls average 4 inches in diameter, the size of a cocoanut. This is a very common product of Mindanao. Some large cylinders of gutta that had been worked before the fire form layers about a thin stick, the whole being over a foot in diameter.

Brea gum is also shown in quantity. This gum is wrapped in the leaves of the nipa palm ; it is a soft, glutinous variety of gum, of dark, almost black, tints. In a small jar is also shown a white resin that was obtained from brea by solution in alcohol.

The resin *nato* or *colobob* is brought into the trade in small dark cylinders, and looks for all the world like crude chocolate.

Resin of the aromatic myrrh tree is also glutinous ; it reminds one of cherry-tree gum in appearance.

Macabuhay is the Tagalog for *Tinospora crispa*. This plant furnishes stems, the heart wood of which is yellow, the bark of a light brown. A decoction of the stems is brewed by the natives and used as a febrifuge, tonic emmenagogue, and antiherpatic. They also cook the bark in oil ; this furnishes them an anti-rheumatic.

Agiya-ng-yiang is Visayan for jequirty or *Abrus precatorius*. The familiar little reddish seeds with a black spot on one end are used as a poison, in decoction likewise as a collyrium. The roots and branches are the Eastern substitute for licorice ; in decoction these are pectoral.

Andropogon muricatus is known as *amoras* in Ilocan. The dried roots are shown in quantity ; they are fragrant, and are used as moth balls, preserving cloth from the attacks of moths. In decoction it is used in tonic baths. Our familiar oil of vetiver is distilled from the aromatic roots of this plant.

One of the finest and largest loments ever seen by the writer is the *Bayuga fruta* or *Balogo* in Visayan. The individual seeds alone are over 2 inches across, flattened and quite round. Some eight such seeds make up the pod ; the contraction between each seed seems to almost separate this pod.

One of the beauties of the forest is the *arbol de fuego*, or tree of fire. In the rainy season, May and June, this tree bears no leaves, but is aflame with large blossoms of red color. These flowers are a half foot across.

Philippine pharmacy is professional. In spite of all the bad that has been written concerning the Spanish conquerors, the professions

of medicine, pharmacy and law were and remained true professions in the strictest sense of the word. No prospective pharmacy student could enter any of the three schools of pharmacy in the Philippines if he had not passed through a high school. Then follows four years' active application to the fundamental studies of chemistry, inorganic, organic and analysis; pharmacy; theory and practice, botany, physics, materia medica. During the four years' course he also practices two years in the store before he may appear before the board of examiners. In the main center of education, Manila, two schools are found, the most important being the department of the University of San Tomas, having a faculty of eight professors and 150 students.

Drug stores are not found on every corner in Manila; in fact, fifty stores supply the 450,000 people of the metropolis and suburbs with their drugs. It must be remembered, however, that many are the natives that gather their home remedies in the jungle, and that one store to every 9,000 people is not excessive. Still druggists are prosperous; they are very important men of the community, being professional men.

What do you think of the old proposition that a druggist cannot prescribe a remedy; that a doctor may not fill a prescription? This wise rule is strictly enforced in the islands; at least, it was under Spanish rule. So far was it carried that a doctor could not even be an owner or part owner of a pharmacy, while a druggist, becoming a doctor, had to dispose of his store before he would be granted the right to practice medicine. This may look absurd; but how many are the doctors that send their patients to a store in this country where a doctor stands behind the counter, or even owns the store? They do not send them there if they can help it. This division undoubtedly adds to the friendly feeling that should exist between the prescriber and the compounder, and adds greatly to the security of the patient.

The drug-store is called a botica or Farmacia. They are usually spacious stores on the European plan. Cases are displayed about the walls; the laboratory is in the rear, separated from the store proper by a railing. Everything looks solid; the floors are of marble, and everything is kept scrupulously clean. At present Manila boasts of an American drug-store; likewise the great English firm of A. S. Watson & Co. have a branch here as well as in other Eastern centers, such as Hong Kong.

The Spanish Pharmacopœia is the standard formulary; then comes the Codex, the German Pharmacopœia, the British and, last, the U.S.P. As the physician would never think of prescribing the patent medicine of Mr. So and So, the druggist is still a druggist in the Philippines. Patent medicines are sold to a slight extent by druggists: Bromo-Seltzer goes lively nowadays; Dr. Jayne's Pectoral, Hood's Sarsaparilla, Antikamnia and the like are called for by Americans. The low-grade Filipino usually buys external remedies, such as oils, plasters, etc. He does not trust the internal remedies to any great extent; still this is also noted in the Mexican, who prefers his aceite every time. The smallest sale is always five cents. Other goods rapidly increase to fancy figures.

Co-operation of druggists is represented in the Union Farmáceutica Filipina. This company has ample capital, and makes galenical remedies for a large number of druggists.

Under the Spanish law the patent-medicine men had to deposit their formula with the proper medical board. Analysis then made had to tally with the stated composition. This naturally kept down the low practice noted in many cases among patent-medicine people. It safeguarded the physician, druggist, and also the people. It seems to us, however, that while a partial application of these rules might be well, still a man is entitled to the fruits of his brain-work. We all know that even State officials, who are sworn to secrecy, often are quite loquacious if approached in the proper manner. This rule has been dropped by the American conquerors.

In closing, it may be well to add that the Igorrotes were not allowed to bum around Manila in their breech-cloth attire, that appeals so strongly to the visitors at the Fair; that while there are dog-eaters, tree-dwellers, head-hunters, etc., in the Philippines, those natives in the coast regions are more or less civilized, especially in Luzon. When you gaze on their art works, their dwelling-houses and manufactures at the Fair, you cannot help thinking that a goodly portion of the people are as civilized as need be, for the tropics, at least.

With the full-blooded Filipino, Prof. Leon M. Guerrero, I conversed in Spanish, aided by his secretary, Mr. Enrique Lopez, a Castillian from the Islands. Professor Guerrero was president of the Pharmacy Examiners, is a noted botanist, and founded the *Liceo de Manila* in 1900.

CLEMENS ALEXANDER WINKLER.

By Carl G. Hinrichs, Ph.C.

On the 8th of October, in Dresden, the most distinguished inorganic chemist of Germany passed away. Born in Freiberg, the celebrated mining district of Saxony, December 26, 1838, son of the well-known chemist and member of the superior mining council of Freiberg, Kurt Alexander Winkler, it is not surprising that he took up the study of chemistry. He studied in the Bergakademie of his native town, and graduated as Doctor of Engineering in 1861. He then accepted the position of director of the Pfannenstiel Prussian Blue Works. In 1864 the degree of Doctor of Philosophy was conferred upon him.

During the 60's many practical papers came from his pen. He studied the difficult separation of nickel from cobalt, separation of lanthanium from didymium, an exhaustive study of the then newly-discovered element indium, and many other papers appeared in the *Journal für Praktische Chemie.*

In 1873 he was called to the chair of chemistry in his alma mater, which for thirty years he filled, adding lustre to this well-known school. In 1903 he retired from active work as a teacher. This position enabled him to thoroughly study the many chemical phases of the chemical and metallurgical industries. We find him again taking up his earlier studies on the Gay Lussac tower, used in the manufacture of sulphuric acid, and find him elaborate the first technical preparation of sulphuric anhydride by the contact process, doing away with the costly lead chambers.

The preparation of large slabs of ductile nickel and cobalt was first solved by him in the early 70's. His untiring examinations of many alloys, new minerals and the like, found its reward in the discovery of a new element. Swelling with pride that he had duplicated the achievement of the French savant Boisbadron of 1876, when he discovered gallium, he patriotically named his new element after the Fatherland—germanium. When we recollect that this germanium is found only as a rare complex sulphide mineral, in minute quantities as an incrustation on rich and rare silver ores of the Himmelsfuerst mines near Freiberg, the almost microscopic examinations made by this chemist of Saxon minerals become patent to all.

The careful studies on fire-damp and the many experiments with sulphurous acid gas naturally demanded of him a thorough examination into the modes of estimation of these bodies. As a result we to-day possess his authoritative work, "Lehrbuch der Technischen Gasanalyse," now in its third edition. As modern manufacturing processes demand quick and accurate methods of estimating the purity of products during the process of manufacture, he thoroughly studied volumetric processes. His "Uebungen in der Maasanalyse" contains all that is reliable on volumetric analysis. There are many earlier works on kindred subjects, but the last two books are among the most widely known.

In latter years he has appeared as critic, he has pointed out many of the erratic and dangerous philosophic notions of the modern chemists, and called for indisputable facts on radium and determination of atomic weights.

THE ANATOMY OF EDIBLE BERRIES.[1]

By A. L. Winton.

THE RED RASPBERRY.

(*Continued from p. 441.*)

Testa (*Fig. 9*, S).—The seed coats of the bramble fruits resemble closely those of the stone fruits, the chief difference being that the epidermal stone cells are wanting.

(1) Epidermis (*Fig. 9*, ep).—The cells are polygonal in surface view, the average diameter being 0·035 millimeter and the maximum 0·070 millimeter. In transverse sections they are cushion-shaped, with a cuticularized outer wall.

(2) Nutritive Layer (*Fig. 9*, p).—The cells in this layer, having fulfilled their mission, are empty and are often more or less collapsed.

(3) Brown Layer (*Fig. 9*, iep).—The inner layer of the testa consists of cells of the same kind as in the outer epidermis, but only about half as large, the maximum diameter in surface view being 0·030 millimeter and the average 0·020 millimeter. These cells are readily distinguished from those of the neighboring layer by their thicker walls and yellow-brown color.

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[1] This paper was printed in *Ztschr. f. Unters. d. Nahr. u. Genussm.*, 1902, 5, 785–814, and is reprinted from Connecticut Expt. Sta. Report, 1902, p. 288.

Nucellar Layer (*Fig. 9*, N).—As in the strawberry, all that remains of the nucellar tissue is the layer of obliterated cells, which in section appears as the thickened outer wall of the endosperm.

FIG. 10.—Raspberry style and stigma. × 32.

Endosperm (*Fig. 9*, E).—A transverse section shows that the endosperm is made up of aleurone-cells with remnants of other cells adjoining the embryo. On the two broader sides of the elliptical section there are five or six cell layers, but the number diminishes toward both the ventral and dorsal sides, where there are only two or three.

The cells are polygonal in surface view, but in section are for the most part quadrilateral, arranged in radial rows. The aleurone grains are the same as in the strawberry.

Embryo (*Fig. 7*, Em).—The structure of the embryo is practically the same as in the strawberry.

Style (*Figs. 10* and *11*).—(1) The Epidermal Cells (*Fig. 11*, ep) are much smaller than in the strawberry, and owing to numerous wrinkles on the surfaces are not so transparent. These wrinkles may be brought out clearly either by treating specimens with iodine as recommended by Tschierske, or better, in the writer's experience, by bleaching with sodium hypochlorite and staining with safranin. On the broadened basal portion of the style are scattering hairs like those of the epicarp.

(2) Bundles.—After heating the style with dilute potash solution, the vessels (sp) and accompanying isodiametric crystal cells (k) are clearly evident.

Examination of Raspberry Preserves.—Styles and stones (seeds with enclosing endocarp) are evident to the naked eye. The former may be examined directly under the microscope as in the case of the strawberry, and are identified by their length (4 millimeters), broadened base with hairs and small wrinkled epidermal cells. Vessels and crystal cells are also striking elements.

The stones are distinguished from seeds of other genera by their characteristic wrinkled surface and

from blackberry stones by their smaller size. Cross sections show the two layers of endocarp, the testa with cells of the outer epidermis twice the diameter of those of the inner epidermis and with a middle parenchymatous layer, the endosperm of several cell layers and the embryo.

The epidermis with hairs for the most part blunt, thin-walled and sinuous, and the crystal cells of the underlying mesocarp may be readily found in mounts prepared from the gelatinous portion of the product. Vascular elements are almost entirely wanting, as the receptacle is not picked with the fruit.

THE BLACK RASPBERRY (*Rubus occidentalis* L.).

This species, a native of the Northern United States, is the parent of the black varieties. It differs from the red raspberry chiefly in smaller size of the drupelet and their deep purple-black color, due

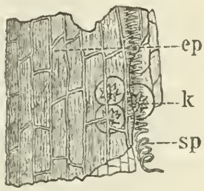

FIG. 11.—Raspberry style in surface view. ep, epidermis; sp, spiral vessels; k, crystal cells. × 300.

to the dark claret-red cell juice. The pits of both are about the same size and shape. The black raspberry has practically the same microscopic structure as the red species.

Black raspberry jam or preserve is of a deep claret-red color and the seeds are stained the same color.

THE BLACKBERRY.

Most of the works on systematic botany describe the dewberry, or running blackberry, as *Rubus Canadensis* L., the tall American blackberry as *Rubus villosus* Aiton; but Bailey,[1] who has examined the original specimens in European herbaria, has found that Linnæus' species is the thornless blackberry (*R. Millspaughii* Britton) and Aiton's species is the dewberry. These names have been restored by Bailey to the plants to which they were originally

[1] *Loc. cit.*, pp. 366–379.

assigned, and the tall blackberry, which would otherwise be without a name, has been called by him *R. nigrobaccus.* The type of this latter species is the common native bush blackberry, with long fruits, and is the parent of the long cluster cultivated varieties, such as the Taylor and the Ancient Briton.

R. nigrobaccus var. *sativus* Bailey, the short cluster blackberry, is a less common native berry, but is the parent of the larger part of the garden varieties, the fruit of one of which, the Snyder, was studied by the writer. *R. fruticosus*, the European wild blackberry, does not occur either wild or cultivated in America.

The dewberry or running blackberry (*Rubus villosus* Aiton) grows wild in all parts of the United States except the extreme West, and has given rise to a number of garden varieties. The berry is hardly distinguishable in microscopic structure from the short cluster blackberry. In macroscopic structure the two are also practically the same, the only difference which the writer has detected being that the epicarp of the dewberry sometimes bears a few hairs.

Macroscopic Structure.—The blackberry agrees with the raspberry in general structure, but differs in the following details: (1) Both the drupelets and the receptacle are glabrous throughout. (2) The drupelets are firmly attached to the receptacle by broad bases, and do not separate from the latter on picking the fruit. There is really no epidermis of the receptacle, as the surface is almost completely covered by the bases of the drupelets, the epicarp of one being continuous with that of the adjoining drupelet. (3) As may be seen from *Fig. 13*, the pits resemble those of the raspberry in shape and markings, but are much larger. (4) The styles (*Fig. 14*) are but 2 millimeters long and commonly arise from a marked depression in the drupelet. They are free from hairs, and do not broaden at the base.

Histology.—Godfrin[1] notes the structure of the testa of *R. fruticosus* L., a European species, and gives a figure of a transverse section. Further than this the writer has found no literature on the histology of the blackberry.

Receptacle.—The structure of the receptacle differs in no essential detail from that of the raspberry.

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[1] Étude histologique sur les Téguments Séminaux des Angiospermes. Soc. des Sciences de Nancy, 1880, p. 153.

Pericarp.—(1) Epicarp (*Fig. 12*, epi).—The cells are for the most part elongated, the longer diameters extending in latitudinal directions on the sides of the drupelets, and in concentric circles about the styles. Stomata are always present, hairs never in *R. nigrobaccus*, seldom in *R. villosus.*

(2) Hypoderm (*Fig. 12*, hy).—As in the epicarp, the cells are commonly elongated, but are much larger, and extend in longitudinal directions.

(3) Mesocarp.—This layer is much the same as in the raspberry. Crystal clusters (k) are numerous, especially near the surface.

(4) Endocarp.—As in the raspberry, the sclerenchymatized fibers of the endocarp have secondary and tertiary membranes, and run longitudinally in the outer and latitudinally in the inner layer.

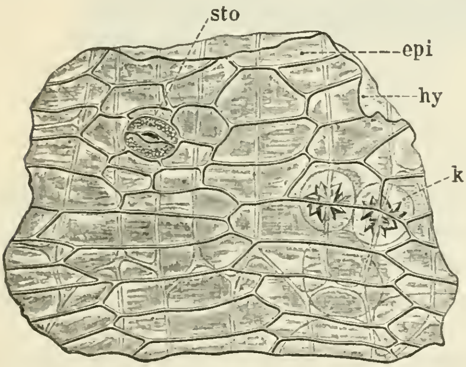

FIG. 12.—Blackberry. Outer layers of pericarp in surface view. epi, epicarp with sto, stoma; hy, hypoderm; k, crystal cells. × 160.

FIG. 13.—Blackberry stone. × 1 and × 32.

Both coats, however, are thicker than in the raspberry, the inner consisting of six to ten cell layers.

Testa.—It has been noted that the outer epidermis of the raspberry testa is made up of polygonal cells with about twice the diameter of those in the inner epidermis. The reverse is true in the case of the blackberry, the testa being much the same as a raspberry testa turned inside out. The average diameter of the outer epidermal cells is about 0·025 millimeter, the maximum 0·040 millimeter; whereas the average diameter of the inner epidermal cells is 0·040 millimeter and the maximum 0·060 millimeter.

Style (*Fig. 14*).—The epidermal cells are about the same size as

in the raspberry, but are not wrinkled to any appreciable extent. Hairs are entirely wanting. Crystals and vessels are conspicuous in potash preparations.

Examination of Blackberry Preserves.—Examination of blackberry preserves is made as described under raspberry. Styles are less numerous than in the latter, and are distinguished by their shorter length, absence of hairs and the smoothness of the epidermal cells. In cooked products it is not usually evident that the styles arise from a depression in the drupelet. The seeds are larger than in the raspberries, but in histological structure are very similar. They are, however, distinguished from the latter by the thicker inner endocarp and by the fact that the cells of the outer epidermis of the

FIG. 14.—Blackberry style and stigma. × 32.

spermoderm are about half the diameter of those of the inner epidermis; whereas, in the raspberry the reverse is true. In blackberry preserves, unlike that made from raspberries, hairs are few or entirely absent; but tissues of the receptacle, notably the vascular elements, are present.

Compared with the strawberry, the bundles are shorter, but more strongly developed, with larger and more numerous vessels. Elongated epidermal cells and crystal clusters are also distinguishable.

THE RED CURRANT (*Ribes rubrum* L.).

Both the red and white garden varieties of currant are derived from the European species, *R. rubrum.* Three varieties, grown in the Experiment Station garden, have been examined by the writer; Fay's Prolific, a red variety with berries often 1·25 centimeters in diameter, Versaillaise, a smaller berried red variety, and the white grape. All of these have the same microscopic structure.

Macroscopic Structure.—The calyx tube of the currant is united with the ovary, and the fruit (a true berry) bears on the summit the shriveled remains of the floral parts (*Fig. 15*, I). The deeply five-cleft bell-shaped calyx tube bears in its throat five petals much

smaller than the calyx lobes, and alternating with them, and five stamens opposite the lobes. The short style, about half the length of the calyx, is deeply two-cleft. The midribs of each of the floral envelopes, ten in number, are continued in the fruit in the form of longitudinal veins and are clearly seen through the transparent epicarp. The anatropous seeds, one to eight in number, are borne on two parietal placentæ (*Fig. 15*, II). As a result of the crowded arrangement they are usually flattened on one or more sides. The outer testa (*Fig. 15*, III S) is gelatinous and transparent and through it may be seen the delicate thread-like raphe and the brown hard

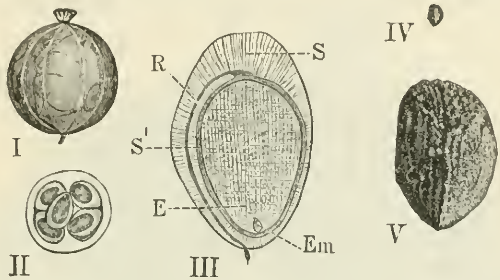

FIG. 15.—Red currant. I Fruit × 1. II Transverse section of fruit with seeds, × 1. III Longitudinal section of seed, × 8. S, gelatinous epidermis of testa; S′, inner testa; R, raphe; E, endosperm; Em, Embryo. IV Seed deprived of gelatinous coat, × 1. V Same as IV, × 8.

inner testa. The minute embryo (*Fig. 15*, III Em) is imbedded in the base of the endosperm.

Divested of the gelatinous coat the seeds are from 4 to 5 millimeters long and from 3 to 4 millimeters broad (*Fig. 15*, IV and V).

Histology.—Lampe[1] has studied the development of the pericarp of *R. setosum* L. and Blyth,[2] and Villiers and Collin,[3] describe briefly some of the pericarp tissues of the red currant. The writer has studied the pericarp, seed and floral parts of the latter species.

Pericarp.—(1) Epicarp (*Fig. 16*, epi). As may be seen in surface view, the walls of the epicarp are irregularly beaded. In parts the walls are almost entirely thickened, with narrow pores; in other parts the walls are not thickened at all or only here and there.

[1] Ztschr. für Naturwissenschaft, **69**, 295.

[2] Foods: Their Composition and Analysis. London, 1896, p. 162.

[3] Traité des Altérations et Falsifications des Substances Alimentaires. Paris, 1900, p. 828.

Frequently strongly beaded cells are divided by thin partitions into two daughter cells. Stomata are numerous. Cross sections show that the cells are considerably broader than thick.

(2) Hypoderm (*Fig. 16*, hy).—Two or three cell layers of collenchymatous cells underlie the epidermis. In surface view they are polygonal with diameters twice or more those of the epidermal cells. Their collenchymatous character is seen in a cross section.

(3) Mesocarp.—Lampe found that this tissue results from the growth of cells formed during the early stages of development and not by cell division. In cross section the cells are isodiametric (from 0·1 to 0·3 millimeter in diameter), with thin walls and numerous

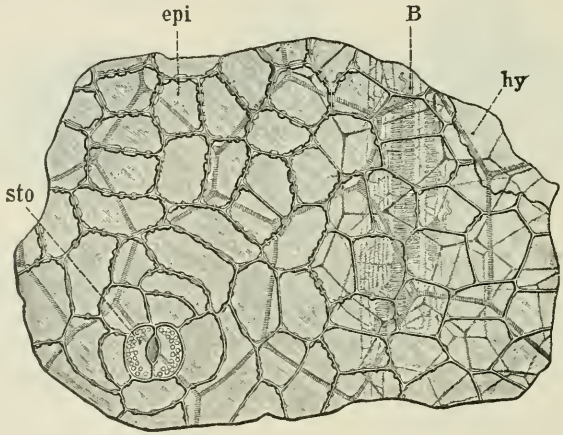

FIG. 16.—Red currant. Outer layers of pericarp in surface view. epi, epicarp with sto, stoma; hy, hypoderm; B, vascular bundle or vein seen through the transparent outer layers of the fruit. × 160.

intercellular spaces. Radiating from the bundles (the veins seen through the epicarp) are elongated cells. Crystal clusters abound in the inner layer.

(4) Endocarp (*Fig. 17*).—Unlike the gooseberry, the currant has a sclerenchymatous endocarp. This remarkable tissue, best studied in surface preparations, is exceedingly characteristic. The long cells are arranged in groups, each group consisting of five to fifteen cells side by side. The cells of adjoining groups may extend either in the same or different directions. Often the end walls of one group adjoin the side wall of the outer cell of another group. Curious crinoid like forms result from the junction of several groups. As a

rule the lumen is much narrower than the walls and oftentimes is reduced to a mere line. Numerous pores connect adjoining cells and some pierce the walls separating these cells from the mesocarp. The cells range in length up to 0·5 millimeter; the thickness of the double walls is from 0·005 to 0·02 millimeter.

Testa (*Fig. 18*, S).—(1) Mucilage Cells (*Fig. 18*, aep).—The outer layer of the testa consists of large but thin-walled cells filled with gelatinous matter. These cells are about 0·09 millimeter in tangential diameter, but often have a radial diameter of over 0·5 millimeter.

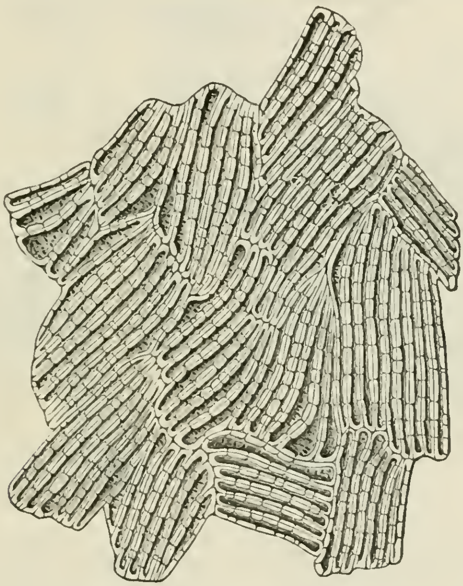

FIG. 17.—Red currant endocarp in surface view. × 160.

On the outer surface they are usually convex. Owing to the great size of the cells, this coat, although but a single cell-layer thick, forms a considerable part of the bulk of the seed.

(2) Parenchyma (*Fig. 18*, p).—Beneath the mucilage cells are several layers of more or less flattened parenchymatous cells with intercellular spaces. The inner layers are smaller than the outer and more strongly flattened.

(3) Crystal Layer (*Figs. 18* and *20* k).—In surface view the deep brown thick-walled cells of this layer are sharply polygonal with diameters from 0·008 to 0·020 millimeter. The middle lamella is

colorless, the thick membrane, brown. Each cell contains a single monoclinic crystal, which nearly or completely fills the cell cavity.

With crossed Nicol prisms these crystals appear as luminous spots in the black background, disappearing on addition of a drop of hydrochloric acid. In section it may be seen that only the radial and inner walls are thickened and that as a consequence each crystal lies close to the thin outer wall.

(4) Inner Epidermis (*Figs. 18* and *20*, iep) —Like the crystal layer, the inner epidermis is of a deep brown color, but this color is due

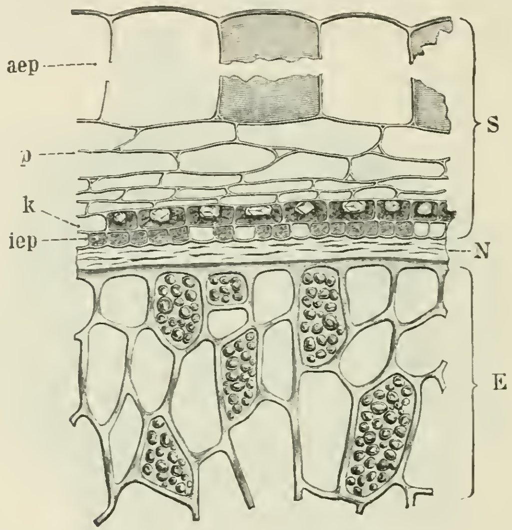

FIG. 18.—Red currant seed in transverse section. S, testa consisting of aep, gelatinous outer epidermis, p, parenchyma (nutritive layer), k, crystal layer, iep, brown layer (inner epidermis); N, hyaline layer (nucellus); E, endosperm. × 300.

to cell contents, not to thickened cell walls. The cells are longitudinally elongated, varying in length up to 0·15 millimeter and in width from 0·004 to 0·009. Both this layer and the crystal layer are readily separated from the endosperm by soaking in dilute potash and scraping.

Nucellar Layer (*Fig. 18*, N).—A cross section of the seed shows a cellulose band about 0·01 millimeter thick between the testa and the endosperm, consisting of the obliterated cells of the nucellus.

The Endosperm (*Figs. 18* and *20*, E) fills the larger part of the seed cavity. The cells are mostly elongated in the outer layers,

but isodiametric in the inner portion and contain aleurone grains and fat. In the outer cells the walls are of even thickness (about 0·002 millimeter), but in the centre of the seed they frequently have knotty thickenings (*Fig. 19*).

Microscopic Examination of Red Currant Preserves.—Cells of the endocarp are the most conspicuous and characteristic elements of currant preserves. Fragments of the epidermis and floral parts are also evident, but are of less value in identification. The outer gelatinous coat of the seed is destroyed by cooking, but the crystal layer and the inner epidermis retain their original form and may be identified in surface mounts prepared by warming the seed in dilute

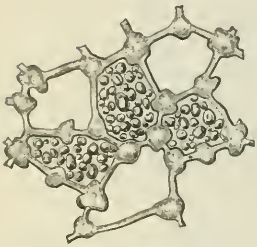

FIG. 19.—Red currant. Transverse section of central portion of endosperm. × 300.

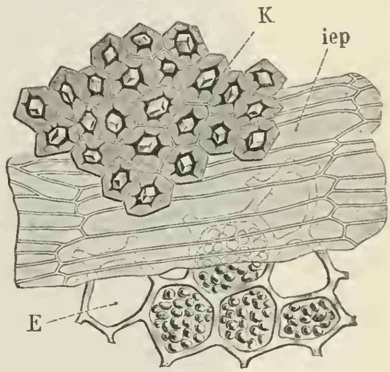

FIG. 20.—Red currant. Testa and endosperm in surface view. Signification of letters same as in FIG. 18. × 300.

potash solution and scraping with a scalpel. Sections of the seed are sometimes useful, but as a rule an examination of the testa in surface view is sufficient.

THE BLACK CURRANT (*Ribes nigrum* L.).

This species does not occur native in America, the cultivated varieties of both Europe and America being derived entirely from European stock.

Macroscopic Structure.—In external appearance the fruit of this species is distinguished from the red currant by its black color and by the longer floral parts. The seeds are somewhat smaller and more numerous (about fifteen in each berry) than in the red varieties.

The calyx is about 7 millimeters long, and the lobes are reflexed.

On the outer surfaces and on the ends of the inner surfaces, the lobes are clothed with numerous hairs; but the throat is smooth, as are also the petals and the styles. The latter is entire for at least three-fourths its length, but two-lobed at the end.

Histology.—Meyen[1] noted the glands on the black currant leaf in 1837. Lampe[2] studied the pericarp but did not describe the glands.

The cells of the *Epicarp* (*Fig. 21*, epi) are beaded and of about the same size as in the red currant. Here and there may be seen the bright yellow disk-shaped glands which are often 0·17 millimeter

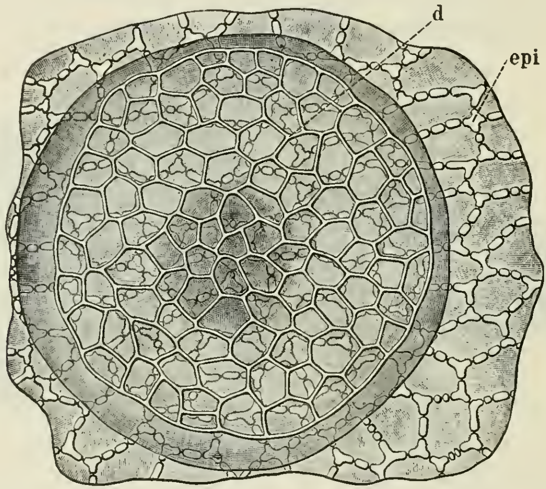

FIG. 21.—Black currant. epi, epicarp with d gland, in surface view. × 160.

or more in diameter (d). They occur in still greater numbers on the leaves, as was noted by Meyen, who found that they agreed in structure with the glands of the hop. These glands consist of a single layer of cells in the form of a disk, joined in the middle to the epicarp by means of a short several-celled stalk. The yellow oily secretion to which the plant owes its characteristic odor and flavor is contained in the reservoir formed by the separation of the outer cuticle from the cells.

The *Mesocarp*, *Endocarp*, and *Seed* have the same general structure as the same parts of the red currant.

Under the microscope the *Calyx Hairs* have the same appearance

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[1] Secretionsorgane d. Pflanzen. Berlin, 1837.

[2] *Loc. cit.*, p. 295.

as those on the epicarp of the raspberry. They are crooked, blunt-pointed, thin-walled, and vary in length up to 0·6 millimeter.

Microscopic Examination of Black Currant Preserves.—Black currant preserves, jams, etc., have a red-black color, and the characteristic spicy flavor of the fresh fruit. They are further distinguished from similar products made from red currants by the glands on the epidermis, the longer floral parts, the hairs on the outer surface of the calyx and the smaller seeds.

The mesocarp, endocarp and seed tissues of the red and black currant are the same in structure.

[*To be continued.*]

PHARMACEUTICAL MEETING.

The opening meeting of the series of pharmaceutical meetings of the Philadelphia College of Pharmacy for 1904–05 was held Tuesday afternoon, October 18th, with Prof. Joseph P. Remington, Dean of the Faculty, in the chair. The attendance and general interest manifested in this first meeting, as well as the nature of the subjects considered, gave promise that the present series of meetings will be as interesting as any held heretofore.

M. I. Wilbert was the first speaker introduced, and exhibited a series of some fifty-odd lantern slides, illustrative of the early history of medicine and pharmacy in this country, the two callings being at first identified as one.

Not the least interesting of Mr. Wilbert's remarks were those relating to the part which Benjamin Franklin took in the development of pharmacy as a separate branch of medicine. And it is especially noteworthy that the great philosopher was the first to make record of the history of pharmacy in this country. In his pamphlet, an "Account of the Pennsylvania Hospital," he gave the first authentic record of the appointment of a pharmacist to dispense prescriptions. To Dr. John Morgan belongs the credit of having been the first physician in this country to write prescriptions, and of the physicians in the eighteenth century there were only two others who followed his example, namely, Drs. Abraham Chovet and John Jones. Reference was made to Dr. Thomas Mitchill, who was chairman of the first Pharmacopœial Revision Convention, this being held in Washington City in 1820, and who also called the next meeting, which was held in New York in 1830. Among the

new features introduced into the New York edition of the Pharmacopœia were doses, and the physical and physiological properties of the substances contained therein.

In 1821 the honorary degree of Master in Pharmacy was conferred by the University of Pennsylvania on a number of pharmacists, this being the first time that a pharmaceutic degree was granted in this country. The University was located in Ninth Street below Market, and a picture of the building as it then appeared was exhibited by Mr. Wilbert. This was followed by a view of the celebrated Carpenters' Hall, where the meeting for organizing the Philadelphia College of Pharmacy was held in 1821, and one of the German Society's building, where the first lectures of the College of Apothecaries were given.

Among the other pictures may be mentioned those of the store and works of Dr. Dyott, America's first cutter; one of Dr. George W. Carpenter, the first to engage in the manufacture of proprietary medicines in this country, and also noted as having first introduced a proprietary sarsaparilla preparation; and one of Elias Durand's store at Sixth and Chestnut Streets, where soda-water was first dispensed, and where the first soda-water fountain was installed as a feature of drug-store equipment. Another notable personage of this time was Dr. Samuel Thomson, the founder of eclecticism, and who appears from his portrait to have been a man of more polish than he is sometimes reputed to have been. The last picture shown was that of the store of Edward Parrish, at the corner of Eighth and Arch Streets, in the room above which the Alumni Association of the Philadelphia College of Pharmacy was organized.

In this connection Mr. Wilbert presented to the Publication Committee a portrait of Daniel B. Smith, who was the first chairman of this committee, the first editor of the AMERICAN JOURNAL OF PHARMACY, the first secretary of the College and its president for twenty-five years.

Dr. Henry Leffmann, the well-known chemist and authority on organic analysis, followed with a paper on "Food Preservatives" (see page 503).

Dr. R. G. Eccles, of Brooklyn, presented a paper on a similar subject, namely, "How Food Preservatives Affect the Public Health" (see page 506).

In discussing this subject, M. I. Wilbert said:

The most important factor in connection with food preservatives

appears to have been overlooked. This is the general practice of adding preservatives to food materials that have undergone partial decomposition or, in other words, practically arresting the decomposition of food at a stage where the generated poison does not manifest itself by the accompanying odor of the more complete decomposition.

When the preservative is one that is readily detected by our sense of taste or smell, this constitutes, in a measure, a warning that will tend to place us on our guard; when, on the other hand, the added material does not manifest itself to our sense of taste or smell, but does prevent the further decomposition in the food material that would attract our attention, we have the really dangerous combination of generated poison (ptomaines) plus the added food preservative, and no marked indication of the presence of either.

All that the gentlemen quoted by Dr. Eccles, or any other rational individual, can and does ask is that all perishable food material containing added food preservatives be properly labeled, so that the buyer may have proper warning and act accordingly. If a manufacturer or dealer wishes to establish a trade in perfectly wholesome food, preserved by the addition of any well-known preservative, he may do so at the present time by properly branding his product.

Charles H. LaWall took exception to some of the statements made by Dr. Eccles in his paper. He stated that while it was easy to prove the harmful action of the ptomaines, it was not easy to prove the deleterious effects of the constant use of preservatives which were undoubtedly harmful. The object of the advocates of the addition of preservatives is not as altruistic as Dr. Eccles would have us believe, but is for the purpose of making money by marketing products which could not otherwise be sold.

Mr. LaWall said that the Doctor was not consistent in saying that he would only allow the use of preservatives in certain products and under certain conditions, for if all the Doctor's statements are to be believed, it would be better to have a law compelling the use of preservatives in every article of food or drink.

The Doctor also confused the terms decay and fermentation, as preservatives are added to prevent the latter just as much as the former, and the latter are usually dependent upon enzymes for their action.

The statements regarding hydrochloric acid were extremely illogical, as the amount which is present in gastric juice, 0·2 per cent., is not sufficient to preserve from decay, while an excess of HCl in the gastric juice *does* prevent the action of the enzymes.

Those who had not followed the subject closely would be misled, too, by the Doctor's statements regarding salicylic acid in fruits, as if the acid exists there at all, it is in such slight proportions as to be undetectable by the ordinary methods of analysis when testing for preservatives, and is, therefore, a negligible factor.

Prof. Henry Kraemer said that it seemed to him that physicians were in a measure responsible for the confusion that exists in regard to poisons, as they have failed as yet to define what constitutes a poison. (See this JOURNAL, 1898, p. 527.) He thought that the question was one which concerned the medical profession especially, and should be referred to the American Physiological Association or to a committee of research workers on animal physiology.

He said that many kinds of food could be preserved by simply heating, but that commercial conditions were such that manufacturers put their goods up in cans and bottles in quantities which were most economical to the consumer. If the product is not consumed at once, and is in the hands of the poorer class of people, who have no ice-boxes or other means of preventing decomposition, they are liable, especially in hot weather, to lose part of the article, which they can ill afford, unless a preservative has been used. Professor Kraemer then read an abstract from a recent number of the *Chemist and Druggist* (October 8, 1904), on the conviction of a dealer in Belfast who had used 7·2 grains of salicylic acid per pint in ginger wine, which conviction the writer said was surprising in face of the evidence and previous decisions respecting the use of preservatives in wine. Dr. T. B. Bradshaw, lecturer on clinical medicine at the University of Liverpool, was quoted by the writer as having expressed a rational view of the matter, as follows:

"The alleged drawback of preservatives, that they open the way for dirty and fraudulent practices, and make it difficult to teach care and cleanliness to the poor, can have but little weight if it be true, as I maintain, that they keep food in a condition fit for consumption, which would otherwise have to be thrown away. In a community in which probably 25 per cent. of the people are too

poor to purchase enough food to maintain themselves in full health the importance of avoiding all unnecessary waste is obvious. Even if we grant all that has been alleged against preservatives, their strongest opponents have not attempted to show that the use of them has ever raised the death-rate to 39 per 1,000. I do not hold up the use of preservatives in food as a council of perfection. If our slums were abolished and our people were all wise and prosperous, there would be less use for them, though I believe that in the case of temperance beverages they will always be needed to supply the place of the alcohol which keeps intoxicating drinks from going bad. What I do maintain is that in the conditions under which the poor live in our large cities their food is certain to undergo rapid decomposition in hot weather unless preservatives are employed."

The following provisional program has been arranged for the next meeting, which will be held on November 15th:

"The True Scope of Scientific, or so-called Expert Testimony in Trials Involving Pharmacological Questions." By Dr. S. Solis Cohen.

"A Record of Several Toxicological Investigations." By George M. Beringer, Ph.M.

"Some Recent Advances in Pharmacy and Medicine." By M. I. Wilbert, Ph.M.

FLORENCE YAPLE,
Secretary pro tem.

PHILADELPHIA COLLEGE OF PHARMACY.

MINUTES OF THE SEMI-ANNUAL MEETING.

The semi-annual meeting of the members of the Philadelphia College of Pharmacy was held September 26, 1904, in the Library, at 4 o'clock, the President, Howard B. French, presiding. Nineteen members were present. The minutes of the quarterly meeting held June 27th were read and approved. The minutes of the Board of Trustees for June 7th were read by the Registrar, Jacob S. Beetem, and approved. The Historical Committee, by its Chairman, George M. Beringer, reported progress. The Committee on Nominations, C. B. Lowe, Chairman, presented the list of proposed nominations for Trustees, which was ordered entered on the minutes. A letter was read from Mr. H. Bell, informing the College of the serious illness of First Vice-President, William J. Jenks, when, on motion of Mr. Boring, the Secretary was directed to convey to Mr. Jenks the sympathy of the members, with the hope that he would soon be restored to his usual health.

The President announced the death of our fellow-members, William Weightman, who became a member in 1856; and Doctor Julian Fajans, who

became a member in 1875. Referred to the Committee on Necrology to prepare suitable memoirs for publication in the JOURNAL.

Prof. Henry Kraemer read a letter from Dr. F. B. Power, Director of the Wellcome Research Laboratories, and an honorary member of this College, stating that he desired to present the papers and other documents relative to the proceedings of the International Congress for the Unification of Potent Remedies, held at Brussels in 1902. Dr. Power's thoughtfulness in making the Philadelphia College of Pharmacy the repository for these papers was commented upon, and the thanks of the College were voted him.

A communication was received from Prof. Edward Kremers, Chairman of the Historical Committee of the American Pharmaceutical Association, requesting a file of the announcements of the College, together with any documents touching upon the history of the College, also reprints with reference to JOURNAL articles, giving page and author. The subject was referred to the Historical Committee of the College.

Action on the proposed amendment to the by-laws, laid over from the last meeting (see AMERICAN JOURNAL OF PHARMACY, August, page 400) was then considered. The amendment was discussed by Messrs. Beringer, French, Kraemer, Wiegand, Meyer, England, Kraus and Ellis, when Mr. Beringer proposed an addition to the present by-law, Article VIII, Section 3, as a substitute, which was adopted. The by-law, as amended, will read: "All applications for membership shall be referred to a standing committee of five, of which the Treasurer and Secretary of the College shall be members, whose duty it shall be to investigate the moral character and professional standing of said applicants, and report at the next stated meeting of either the College or Board of Trustees, to which the application has been presented. It shall also be the duty of this committee to consider the ways of increasing the membership, and to report annually at the meeting in June on the status of the membership of the College."

The election for three Trustees was then proceeded with; Messrs. McIntyre and Kraus were appointed tellers, who, after a ballot, announced that Edward M. Boring, Richard M. Shoemaker and Charles Leedom had been unanimously re-elected for the ensuing three years.

ABSTRACT FROM MINUTES OF BOARD OF TRUSTEES (HELD JUNE 7, 1904).

The Committee on Library reported a number of accessions, among them eighty-four volumes from the library of the late Charles F. Zeller, presented to the College by his father. The Committee on Accounts and Audit reported that the books of the Treasurer, Registrar and Committee on Publication had been audited and found correct.

The Committee on Announcement reported that they had contracted for the printing of the Announcements for the year 1904, and that they would be promptly distributed.

Walter E. Brown, Lorne E. Hastings, George A. Siegrist and Harry A. Spangler were elected to active membership. Wilbur Le Roy Lafean, Walter Eugene Dittmeyer and Charles B. Fricke were elected to associate membership.

C. A. WEIDEMANN, M.D.,
Secretary.

SPECIAL MEETING.

OCTOBER 24, 1904.

A special meeting of the members of the Philadelphia College of Pharmacy was held at 3.30 o'clock. The President, Howard B. French, in the chair. The call for the meeting was read:

Mr. Howard B. French, President.

DEAR SIR:—We respectfully request that you call a special meeting of the members of the College to take appropriate action upon the decease of First Vice-President William J. Jenks, Ph.M.

Signed, THOS. S. WIEGAND,
GEORGE M. BERINGER,
JACOB S. BEETEM.

Mr. French, in feeling language, alluded to the great loss the College had sustained in the death of Mr. Jenks. He felt it as a personal loss, as he had enjoyed his friendship for many years, and it was his privilege to meet with him often to discuss College affairs. Mr. Jenks graduated from the College in 1842, and was elected to membership in 1846, and a few months afterwards was elected a member of the Board of Trustees, serving the College for fifty-eight years with rare fidelity as trustee, secretary and vice-president.

At the call of the chair for remarks, Mr. Charles W. Hancock, a former apprentice, alluded to the uniform kindness he had received from Mr. Jenks. He recalled some of the early incidents of their association together, and said that he had enjoyed his friendship ever since.

Dr. Lowe said it was a pleasure to come in contact with Mr. Jenks. He was a courtly gentleman of the old school—genial and upright, and all who knew him felt that he was the grand old man of the College.

Wallace Procter said that he had known Mr. Jenks for many years, and all agreed that one of his great characteristics was his kindliness of heart, which was especially shown towards struggling students, and that he always wanted to help them to the full extent of his ability.

Dr. Mattison alluded to Mr. Jenks as having a unique personality, as being a strictly Christian gentleman and a great loss to the College.

Mr. James T. Shinn alluded to the remarkable courage displayed by Mr. Jenks amid severe financial losses.

Professor Remington said we have lost one of the best friends the College has ever had. Mr. Jenks was a strong man, and all could see he loved his fellow-men. His beaming face, his kindly attitude, the particularly tender side for students, his warm friendship, all was evidence of the kind Christian gentleman. He also alluded to his long service on the Committee on Examinations, his devotion to the best interests of the College, and said that he will be sadly missed.

Mr. Thos. S. Wiegand alluded to the young manhood of Mr. Jenks in the store of Smith & Hodgson, and how he had corrected typographical errors in some of the early editions of the United States Dispensatory, for which he had received the thanks of the late Dr. George B. Wood.

Mr. Evan T. Ellis could confirm the remarks that had been made. He had been associated with Mr. Jenks in connection with the drug trade and in social and church circles for the past fifty years. His vigor of mind and body had astonished him.

Mr. M. N. Kline said if any one could make a word-picture of the characteristics of Mr. Jenks, it would make a book of considerable size. He was a notable example of cheeriness under all conditions. Such reverses as he had endured would make most of us blue, morose or, at least, impatient. Even great affliction, the loss of his wife, did not seem to affect his cheerful manner. He was an example worthy of all emulation—a marked example of cheerfulness.

Mr. George M. Beringer spoke of his having recently received an autobiographical sketch of Mr. Jenks—written since his illness began. It would make an article for future publication in the AMERICAN JOURNAL OF PHARMACY. He further remarked that the cheery smile of Mr. Jenks had been an inspiration to him in his student days and ever since.

Mr. William J. Miller spoke of the genial, happy disposition of Mr. Jenks during all of the forty-nine years he had known him. He wished to testify to the cheerful courteousness of the man, and confirm all that had been said by others.

A letter was read from Mr. Edwin M. Boring regretting his inability to be present to show, with others, his respect to the memory of Mr. Jenks. The lesson of his life to us is that we should cultivate the genial side of our lives, that we may have hosts of friends and few enemies.

Professor Remington then offered the following resolutions, which, being seconded by Dr. Mattison, were unanimously adopted:

WHEREAS, The Philadelphia College of Pharmacy, by the death, on October 21, 1904, of First Vice-President William J. Jenks, has suffered an irreparable loss; therefore be it

Resolved, That his long and devoted service of fifty-eight years as trustee and officer in this College completes a record of fidelity and earnest work which merits the gratitude of every member.

Resolved, That this College places on record its deep sense and sincere appreciation of the character of our deceased officer. Honest and true, urbane and unselfish, he won the hearts not only of his contemporaries, but of every student who came under the influence and charm of his personality.

Resolved, That these resolutions be entered upon the minutes, and that an engrossed copy be sent to the family of our deceased officer, and that we extend to them our heartfelt sympathy in their bereavement.

There was a large number of the members of the College present, among whom were (some failing to record their names):

George M. Beringer, Robert T. Berry, Jacob S. Beetem, E. Fullerton Cook, Charles H. Clark, Evan T. Ellis, Joseph W. England, Howard B. French, Charles W. Hancock, Mahlon N. Kline, Henry Kraemer, William E. Krewson, C. B. Lowe, Charles H. LaWall, William McIntyre, A. W. Miller, William J. Miller, R. V. Mattison, O. W. Osterlund, Wallace Procter, H. N. Rittenhouse, J. P. Remington, W. A. Rumsey, Samuel P. Sadtler, H. L. Stiles, James T. Shinn, F. P. Stroup, Thomas S Wiegand and C. A. Weidemann.

C. A. WEIDEMANN, M.D.,
Secretary.

THE AMERICAN JOURNAL OF PHARMACY

DECEMBER, 1904.

A NEW METHOD FOR THE PURIFICATION OF WATER SUPPLIES.[1]

BY DR. GEORGE T. MOORE.

At the time I accepted the invitation to speak before the American Philosophical Society, the method devised in the Laboratory of Plant Physiology for the purification of water, the work upon which has been so ably supported and advocated by Drs. Galloway and Woods, of the Bureau of Plant Industry, had not received the notice in the public press which has since been given it, and I fear that many of you will be disappointed if you have come this evening with the idea of hearing anything spectacular or startling concerning the subject. It will be difficult for me to say anything particularly new after the very thorough discussion which has been carried on by the newspapers in your city and elsewhere, and whereas I once might have hoped to interest you by the novelty of the method and its results, about all I can now expect to accomplish is to give you a statement of the facts as they have developed. Perhaps the best way to bring the subject before you is to outline briefly the history of the work as it has been carried on during the last four or five years.

While teaching in New England, I frequently had called to my attention cases of water reservoirs which, because of the profuse growth of certain plants, had been rendered unfit for use. Those of you who have had any experience with water of this kind know how disagreeable it can become, and until recently

[1] An address given before the American Philosophical Society, Friday evening, October 21, 1904.

the situation was complicated by the fact that absolutely no efficient remedy for the condition was known. The plants responsible for this bad odor and taste in the water are for the most part confined to a group known as the Algæ, and are among those forms popularly known as "pond scum," "green scum," etc., which occur so abundantly in stagnant pools during the warmer months of the year. While in some instances the disagreeable odor is due to the death of these organisms and consequent decomposition, this is by no means the only way in which these plants affect the water. Very many of the blue-green algæ, together with certain other more or less closely related forms, have the power of liberating an oil which is comparable to one of the aromatic series, a very small quantity being sufficient to affect a large amount of water. The odor and taste of these oils is variously described by different consumers, but in no case is it any addition to a drinking water, and at times the odor becomes so strong as to make it almost impossible to use the water for sprinkling the streets and lawns, to say nothing of domestic use. Up to the present time only the most general methods have been resorted to to prevent the growth of these algæ in water supplies. The problem has been one which frequently confronted the water engineer, but, although many costly experiments have been carried on, the results in almost every instance have failed to accomplish what was desired. One of the favorite recommendations made to water companies for difficulty with algæ was to cover the reservoirs. Since most of the algæ require light for their development, this was a very logical recommendation, but unfortunately the expense and inconvenience of constructing a permanent cover for most reservoirs is almost prohibitive, and there have been very few water companies in this country which have even made the attempt to exclude the algæ in this way. Another precaution which of late years has been almost universally practised in endeavoring to keep the source of supply and reservoir free from algal growth is to carefully remove as much of the organic matter as possible, which will in time be in contact with the water. Naturally, when new reservoirs are being constructed every precaution should be taken to prevent the presence of any more organic matter than is necessary, as this only serves to increase the nutritive value of the water, and consequently the algæ flourish more readily. In this connection it should be borne in mind that even though reser-

voirs are carefully constructed and the majority of the organic matter excluded by concreting the reservoir, there is even then a strong possibility of the water being rendered unfit for use by the presence of these obnoxious plants. Filtered water is more subject to algal pollution than surface water, because any water passing through a considerable layer of sand is apt to pick up certain nutrient salts which enable the water to sustain algal life in larger proportions than it would otherwise do. Still another method supposed to prevent contamination by algæ is that of pumping air into the water, or aerating it by means of some sort of spraying apparatus. Unfortunately, however, many of the unicellular algæ are able to multiply more rapidly with a plentiful supply of air than without it, and for this reason aerated water has been known to give rise to serious algal growth when it would otherwise have been unable to sustain the life of these plants in any considerable quantity. In certain parts of New England the conditions due to the presence of these plants are notorious, the trouble being very serious and the water frequently unfit for use a considerable part of the year. But the difficulty is by no means confined to this region, there being scarcely a State in the Union which has not reported serious difficulties of the same kind. Since the condition seemed to be one which called for some relief and none of the used methods were of more than partial benefit, it seemed advisable that the problem be taken up from an entirely new standpoint, and for this reason a series of investigations were undertaken for the purpose of gathering all the information possible in regard to the life history of the organisms, as well as the physiological effect of certain substances under laboratory conditions. A large number of substances were experimented with, and in a very short time it became evident that nothing was so toxic in high dilutions to these forms as certain of the heavy metals.

At about this time an opportunity presented itself for experimenting on a large scale in the cress beds of the South. Here the conditions were such that after the cress had been cut and before the new growth could start, a thick heavy mat of algæ would form over the surface of the water sufficient to prevent the growth, if not entirely smother out the delicate cress plants. Since water cress at that time of the year was worth about $20 a barrel, and the demand was considerably greater than the supply, a large amount of money

was being lost in this way, and it seemed worth while to experiment with these beds and see if it would not be possible to exterminate the algal growth without destroying the cress. Consequently, a solution of copper sulphate (this metal being used on account of its cheapness, it having been shown to be fully as efficient as any of the others) was prepared of a strength of about one to fifty million parts of water, and this was sprayed upon the algal mass in hopes that it would accomplish the desired result. While its use was fairly satisfactory, it was soon found that the method of application would have to be improved before any success could be attained, as only that part of the growth was destroyed which the spray was able to reach, and the algæ within the center of the mass or some distance under the surface remained uninjured. The method was then tried of adding directly to the cress beds a sufficient amount af copper sulphate crystals to make a solution of about the same strength, and this gave almost immediately most satisfactory results. In a very short time all of the algal growth was exterminated, and although the first application was made in the fall of 1901, it has never been necessary to apply copper more than once a year to these beds. Naturally, the degree of success attained in this work, while not in any way demonstrating that a similar method would be efficacious in large reservoirs, seemed to warrant a more thorough investigation of the subject, and for this reason a large series of tests was inaugurated calculated to demonstrate the toxicity of copper upon most of the common polluting algæ which occur in these supplies. It was soon found that the toxicity varied very greatly for the different plants, and that no universal strength of solution could be used which would result in the extermination of all forms. However, the dilution necessary to kill any of these algæ was so high that it seemed to offer by far the most promising remedy which had ever been devised. Of course, in hoping to perfect any method of this kind, it was necessary that the question of efficiency, cost and harmlessness to man be kept prominently in mind. In regard to the first point, no amount of laboratory demonstration is equal to the practical application of a method on a large scale. For this reason, while it might be very interesting to give you the results of a long series of experiments conducted on different organisms for the purpose of determining their death points in dilute solutions of copper sulphate, I am sure it would be more con-

vincing to give you briefly the results of the treatments of a very few of a considerable number of water supplies which have either been treated under our direction or as a result of the experiments and information given out by the Department of Agriculture.

In June, 1903, our attention was called to the condition of the reservoir at Winchester, Ky. This supply was constructed in 1890, and after the first three years a strong odor and taste was noticeable in the water during the hot summer months. This condition gradually increased until the water attained such a degree of offensiveness as to make its use for any purpose almost intolerable. Aeration and mechanical filtration were tried without effect, and it seemed that the only hope for relief was to abandon the entire reservoir and go ten miles to the Kentucky River for the source of a new supply. The cost, however, was too great to be considered, and for this reason the difficulty was considerably increased. A microscopical examination of the water showed that the odor and taste was due to the presence of one of the blue-green algæ, and it was believed that the application of copper sulphate at the rate of about 1 to 5,000,000 would be sufficient to destroy these forms; consequently, there being no objection on the part of either the water board or the health authorities, a treatment was made, and the results have been everything that could be desired. Within three or four days the odor disappeared and the water was perfectly clear. This summer at about the same time it was feared that the algal growth was reappearing, and for this reason another slight treatment was made, but with this exception no copper has been added to the water since the original treatment in June, 1903, and it has remained perfectly clean and sweet.

In 1892 the Butte (Mont.) City Water Company began the construction of a large impounding reservoir for the purpose of storing the water of a mountain stream, having its source in the summit of the Rocky Mountains. The next year the stored water became badly contaminated and was unfit for domestic use on account of its disagreeable odor and taste. In 1894 the dam was increased so that the capacity of the reservoir was 180,000,000 gallons, but the same trouble was experienced as during the previous year, and further work was stopped on the dam until some remedy could be discovered. An extensive study of the conditions to discover the cause and find a remedy for the trouble was undertaken, and, besides a

resident chemist and bacteriologist, consultations were held with water engineers of note in all parts of the country. It was finally decided to increase the water supply flowing into the reservoir and more thoroughly clean the bottom of all organic matter which might contain vegetable organisms. Notwithstanding the efforts made in this line, the water was so infected with algæ as to be absolutely nauseating in odor and taste, and it became so offensive that the odor was continually present in the city on account of the water being used in sprinkling carts. On July 7th of this year copper sulphate was added to this reservoir in the proportion of 1 part to 8,500,000 parts of water. During the first twenty-four hours the water in the reservoir gave off a most pronounced and disagreeable odor, and at the end of the second and third days changes were noticed in the color and taste of the water, particularly in the lower depths. By the end of the fifth day the water assumed a natural color and only a slight odor and taste was noticeable on the surface. On Sunday, July 24th, the water in the reservoir being absolutely pure, for the first time in ten years, during the summer months, was turned into the city mains, and since this date has been in constant use.

Without giving the details of other experiments, perhaps it would be sufficient to read a few of the reports from water engineers and superintendents who have used the copper sulphate method in this country.

From C. T. Hawley, Secretary of the Cambridge (N. Y.) Water Works Company: "The use of copper sulphate has certainly been most successful in our case. Not only has the Water Company been saved the considerable cost of the repeated cleaning of the reservoir, but the residents of our village have been saved the annoyance of having at times to use a most unsatisfactory water supply."

Proctor & Gamble Company, Ivorydale, O.: "We are much pleased with the result, and thank you for your kind and prompt advice."

Anton Hardt, Wollsboro, Pa.: "Soon after the application of sulphate of copper the algæ disappeared and with them the disagreeable odor, and the water has been palatable ever since. I wish to express this company's gratitude to your department for prompt and efficient action in this case and have to say the application of this method will be of great service to water systems."

J. A. W. Brubaker, Secretary of the Millersburg Home Water Company, Millersburg, Pa.: "Enclosed you will find a statement in the matter of the extermination of algæ. This experiment was made by the Millersburg Home Water Water Company, and the results are very satisfactory."

A. W. Harris, Director of the Jacob Tome Institute, Port Deposit, Md.: "I am writing now to say that the improvement in the taste and odor of the reservoir water was extremely marked, and the trustees have expressed themselves as very much pleased with the result of the experiment. The water is now in a very satisfactory condition, and it seems to us your discovery is likely to prove of great importance. We shall always feel grateful for having known of it."

Alfred M. Quick, Engineer Water Board, Baltimore, Md.: "I have completed the experiment of treating the water in Lake Clifton with copper sulphate to eliminate the algæ, and am glad to say the result has been an unqualified success."

These, with other cases which have been referred to in the Philadelphia press, seem to me sufficient to establish the question in regard to the efficiency of the method for the removal of algæ. It might also be considered as having answered the question of harmlessness to men, since in many of these cases the water was not cut out of service for an instant, but the consumer was supplied with the copper-treated water in the same quantity and way that the algal polluted water was furnished. Of course, a great deal might be said in regard to the effect of copper upon the human system. and there is a large amount of evidence to show that by actual test this metal is not as poisonous as it is popularly supposed to be. Without attempting to review the literature upon the subject or give you a list of the considerable number of experiments which have been carried on by investigators who have eaten large quantities of copper for more than a year at a time, it probably is sufficient to say that there does not exist an authentic case of copper poisoning. This may seem surprising, but a careful investigation of the facts will, I am sure, demonstrate the correctness of this statement. While it is true that there are many so-called cases of copper poisoning, and the popular belief in the deleterious effect of this metal upon the human system is very strongly established, the fact still remains that all of the so-called cases of copper poisoning are due to other things, and the bad effects ascribed to copper have

been due to causes not generally recognized at the time. I am aware that this is a point upon which the experts disagree, and about as many men can be found who will claim that copper is a poison as those who maintain that it is innocuous. It seems to me, however, that under the circumstances, since those who are supposed to know cannot agree upon this point, that we are justified in taking what might be termed the evidence of experience, and basing our conclusions upon this. The very well-known fact that copper is contained in proportionately considerable quantities in a good many ingredients of our daily food, and that this amount of copper, while sometimes added artificially, is often naturally present, should lead us to the conclusion that certainly these infinitesimal amounts are not harmful. The decision of the English judge in the case of prosecuting a dealer for using copper in greening vegetables is worthy of note. Being somewhat bewildered by the large amount of testimony, the experts on both sides were able to produce, proving definitely both the poisonous and harmless nature of this metal, he based his decision upon the fact that in a market which had been selling these greened peas for thirty-six years, and had now reached a number of about 20,000,000 cans a year, the prosecution were unable to bring forward a single case of sickness or injury which could be traced even in the remotest way to the use of these vegetables. A can of these peas, by the way, contains several hundred times more copper than would ever be used in the treatment of a water supply.

If within the last four or five months over fifty water supplies throughout the country, with reservoirs varying from a few to hundreds of millions of gallons, and which for years have been rendered unfit for use because of algal pollution, can be successfully cleared up with one or two applications of copper sulphate at a dilution of from one to fifty million, it seems to me that we are justified in believing that the method is efficient, and accomplishes something which, until it was introduced, has been considered one of the unsolved problems in water supply work. Whether it is harmless or not I will not discuss further. This is a question which must be decided by the authorities of each community, and, of course, if there is any doubt on the subject, the method should not be used. It does seem strange, however, that there should be any objection to the possibility of taking into the system a substance

which is daily being used in quantities a hundred times greater, and without any harmful results so far as is known. The fact that the copper rapidly disappears from most waters, and that at least 10 per cent. of it is immediately absorbed by the algæ and becomes insoluble, need not be taken into account, although it, of course, tends to make the method more secure for those who have objections to the presence of copper in food or drink, when they know it is there.

Very naturally after it was noted that the algæ were so susceptible to infinitesimal quantities of copper, it seemed worth while to test the effect of this metal upon typhoid and cholera germs, these being the two pathogenic forms which are most commonly conveyed by water. As the result of some 500 or 600 experiments, it was demonstrated that, while these bacteria were not as sensitive as the algæ, still the dilution necessary to produce death was sufficiently great to warrant the belief that under certain conditions efficient sterilization of large bodies of water could be brought about. It should be stated most emphatically and clearly understood that it was not supposed for a moment that such a method could be substituted for efficient sand filtration or any other means now in use which has been demonstrated as doing the work thoroughly. It was believed, however, and practical tests since made have proved it, that in cases where no system of filtration existed, or where the filter failed, owing to the storage basin being flooded by surface drainage, or because of leakage or other cause, this method was not efficient, that in copper sulphate we had the only remedy for such emergency cases. It should be borne in mind that nothing is more delicate or requires more intelligent and conscientious supervision than a filter plant. Any one who has had an opportunity to visit many such plants throughout the country and really knowing their inside workings, as it were, cannot help being astonished at the low rate of efficiency frequently maintained. Consequently, the application of copper sulphate under such circumstances for the purpose of reducing the bacteriological content has been used successfully in enough cases to demonstrate that it has a distinct place in water purification. So far as I know, its use has been resorted to for but a short time, or until the source of pollution could be removed. Whether it would be efficient and proper to use it continuously during a considerable period awaiting

the completion of a filtration system, is a question to be decided by the conditions governing the case. There is no doubt in my own mind that under certain circumstances such use would be justified, and the results would more than repay any outlay of money and labor.

It should be remembered that it is not a question of an efficiently filtered water as compared with a water containing a minute quantity of copper, but it is a typhoid or algæ-laden water versus copper water. Some of you may object to the use of small quantities of preservatives in meat, but if it is a question of preserved meat or decayed meat until the new supply arrives, I do not think you would hesitate very long. The use of copper for the removal of algæ and bacteria is necessarily a remedy, and each water supply requires a special prescription according to the various conditions involved.

In one case where copper was used for the purpose of destroying the algæ, the bacteria were reduced 95 per cent., and while sewage bacteria were found before treatment, they disappeared entirely afterwards. In another case where a large storage reservoir was flooded, owing to the breaking of a levee, the bacteria were reduced from over 5,000 per cubic centimetre to less than 50 per cubic centimetre. Again, in the case of a spring which was accidentally polluted, and which gave rise to over fifty cases of typhoid in less than a week, the use of copper completely sterilized the water, and it was possible to continue using the spring within five hours.

Since the use of copper for the destruction of typhoid and cholera has been more prominently brought before the public, a number of most interesting cases have been called to my attention, which seem to add considerable weight to the laboratory or experimental side of the question. Many of these have already been referred to in the press, but the fact that certain communities have for centuries used water from copper vessels to avoid cholera, that workers with copper are popularly recognized as being immune to this disease, that the use of copper sulphate in Indianapolis years ago effectively stamped out cholera—all of these facts with many others are, it seems to me, worthy of consideration, even though they require careful scientific investigation to make them of value.

The question of the use of copper in medicine is one I cannot discuss, although I should like to. It is daily being used in quantities so much greater than would ever be added to a water supply,

that many physicians evidently do not consider it as poisonous as it is supposed to be. When we remember that copper in water is 100 times more efficient as a germicide than carbolic acid, fifteen or twenty times more than formalin, and, in fact, nothing is known which, when free from organic matter, is so deadly to germs and harmless to man, it certainly seems that the beneficial results obtained by the physician are easily explained.

In conclusion, then, I would say that in spite of a considerable number of articles appearing which seem to clearly demonstrate that copper in such small quantities will not destroy algæ and certain pathogenic bacteria, the fact remains that it has been done and is being done in millions of gallons of water in various parts of the country. It is like the old arguments against the Atlantic cable, or the treatise carried by the "Great Eastern" on her first trip, scientifically demonstrating the impossibility of such a ship crossing the ocean. It is also interesting to note that without exception the amount of copper necessary to produce death of both algæ and bacteria in a large reservoir has always been less than the theoretical amount determined in the laboratory by the use of aquaria and test tubes.

It is probable that there will always be a certain amount of opposition to the use of copper for the purification of water just as there is to vaccination or antitoxine, but as more and more cases are added to the list of supplies successfully treated without harm to the consumer, this aspect of the question will disappear. This is well illustrated by the attitude of the French Government which originally maintained such rigid laws against the use of copper in canned goods and otherwise, but as the Prefecture of Police of Paris recently wrote:

"Up to the year 1899 the subject of the possible bad effects on the health of the people by the introduction of sulphate of copper in the preparation of preserved vegetables had not been so much studied as it has of late, the scientific opinion being divided. But since that time the Consulting Committee has been renewed, and has again taken up the question and passed on the experiments made by private parties both as to the quantity of copper that the human body can consume without danger to health, as well as the proposition that the various preserved foods that are colored green may contain. From these experiments they came to the conclusion

that there was no longer any reason to oppose the system of greening preserved vegetables by means of the salts of copper."

Consequently it is now allowable in France to use salts of copper for preserving the green color in food products in any amount, although until the harmlessness of this metal became known it was forbidden to even use a copper vessel for preserving purposes.

PHARMACY AND CHEMISTRY AT THE WORLD'S FAIR.

By Carl G. Hinrichs, Ph.C.,
Professor of Chemistry, Marion-Sims Dental College.

(*Continued from p. 531.*)

VI. GERMANY: CIVILIZED AND UNCIVILIZED.

When the readers see this the great Louisiana Purchase Exposition will be a thing of the past. It will ever be kept green in minds of the millions that attended, by pleasant memories of pike, of grand palaces and of magnificent displays of the wonders of nature and the handiwork of man. To those who come after us, it will probably be known as the exposition of the grand prize. As a visitor during the last month of the fair, it seems that this highest award has been bestowed on a most lavish scale. We find exhibitors in the same lines who each boast of this highest honor, while many have an array of gold medals to set off the parchment.

Entering Germany's chemical exhibit, we find that it is not without its full quota of these mementos; in fact, to use a familiar expression, they may be said to be "it." At least thirty-three grand prizes have been decreed to our Saxon brethren for superiority in this field alone by the superior jury. Of gold medals they receive thirty-one; the number of minor prizes need not be mentioned.

Germany, in the pharmaceutical and chemical lines, cannot be said to make a commercial display; in fact, they themselves make no pretensions in this line, for the big firms cared not to go to another great expense so soon after the Paris Exposition, especially as the high tariff is a bar to the successful exploitation of many chemical goods of strict commercial value in the United States.

The underlying idea of the Germans to make at this exposition an *Unterrichts Ausstellung* has been carried out with a certain degree of success. This method naturally brings to the mind the idea of a

systematic arrangement of the objects displayed. But there are many articles that do not lend themselves to this mode of display; the so-called systematic in practice often proves a failure. So we need not be surprised that many features had an unrivalled success; others had all the ginger taken out of them by the attempted systematic arrangement, due to an overdoing of the otherwise excellent idea. It is especially in the exhibit of chemicals that this systematic arrangement was applied to an excess. Chemicals are used in many forms, in many industries and for many purposes. Can we wonder that chemists did not care to linger at their display of chemicals? Will a modern specialist hunt up what may be interesting to him from out of thousands of compounds shown? Experience is our guide; chemists did not stay and study the chemical display hours at a time, but simply glanced here and there and passed on.

Theorie und Praxis are very often found not to go together very well. The wonderful products of German thought and skill are often found to be in very queer company; a highly important chemical of recent date is often associated with a purely technical article Americans make on a large scale. Do we not lose the idea of importance of a discovery or, vice versa, of the technical article by this association? Surely what Germany produces by the millions of pounds annually will appeal more strongly to some chemists than that which was only made once and that sample now before you. Indeed, when you come right down to the first principles o inorganic chemistry, is not a study of metals, bodies having many points in common, but differing by slight variations in malleability, lustre, color, ease of production from ores, insolubility, etc., more easily studied and learnt than when these same metals are thrust upon you unassociated with their kind? Is it not the acid radical that gives a salt its true chemical character, which is modified gradually step by step as we have another metal in combination therewith? What would one think of a man that, treating of a hydrocarbon in organic chemistry, follows this with all the derivatives, ethers, etc., in which that same radical may enter? The latter may do for a dictionary, but hardly for an *Unterrichts Ausstellung*.

In spite of the heterogeneous nature of the German systematists' attempt, here and there an article may be found that is important medicinally or shown to us under a new garb of purity and strength. We detected a number of colloidal metals, such as col-

loidal gold and silver, which lend themselves to antiseptic treatments. Peroxide of hydrogen as a thick syrupy liquid, 100 per cent. in strength. This is a product made by the gentleman who has studied peroxide for twenty years. We all know that we can make granulated salts of fine appearance if we stir a hot concentrated solution as it cools. The Germans are now making many salts of reasonable sized uniform crystals by gradually cooling a slowly moving hot concentrated solution of the salt. A jar of fine alum crystals of this kind is shown. Winkler's germanium exhibit, process for making sulphuric acid and his other technical feats were rewarded by a grand prize.

In this same room we see the many apparatus used in the study of inorganic chemistry. A wealth of fine graduated ware, thermometers, gas analysis appliances, Jena glassware, royal porcelain goods. These take up room, they do not hide themselves; as a result many study this feature of the exhibit thoroughly. It is a decided hit.

In the organic chemistry division the thousands of dyes that have made Germany famous, or infamous when wrongly applied, are shown in large array. A case of some 500 compounds shows, for a wonder, the historical development of the industry.

The many beautiful and large samples of ceresin and of other natural hydrocarbons contrast strongly with the artificial like compounds, derived from fish oil and various vegetable oils. The Standard Oil Company need fear no competition from this source.

Looking at the caffein, theobromine and like products indicating the steps taken from the uric acid furnished so liberally by our feathered friends, the sea birds, a fear that some day we may sip a cup of coffee or cocoa that originally traced its ancestry to the manure piles of the Pacific, is not altogether a pleasant one.

Fortunately all alkaloids come under one head, so that the whole branch is displayed in a single case. The many decomposition products, commonly called Abbau-Produkte, of the alkaloids that helped chemists to study their constitution and incidentally make them artificially, are instructive.

Synthetic perfumes and essences that vie with the natural odors are many. Jonon, jasmin, rose and the like are in pint bottles, a mere sniff at the stopper shows the fine quality of these products.

In this room we find the many aids used to-day by the synthetic

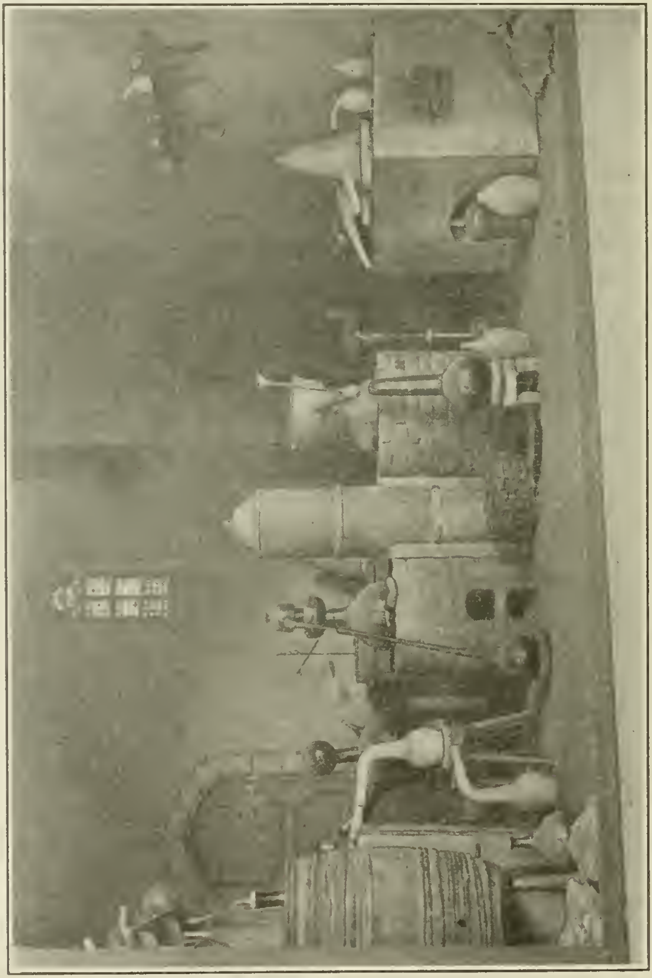
chemist; electric and gas combustion furnaces, vacuum-distilling apparatus, bombs, appliances for working under pressure and the like, also the many appliances used by the dye chemist and colorist to determine by actual experiment the value of the artificial dye product. The many samples of such dyed goods showing all the nuances of the rainbow, and these in fast colors, can be said to represent one industry of Germany in a manner worthy of its grand development.

Under physiological chemistry are found the many ferments, fermentation products, and also the synthetics. An especially interesting exhibit is the series of preparations showing the constitution of the fats, as determined by fermentation. Stearic acid, glycerin, palmitic acid and many others of high purity are prepared by fermentation at 37°. No decomposition products are found in these preparations that usually accompany those prepared by the classical chemical methods.

Buchner, who showed that the cell is not a necessity or fermentation, that the changes are not dependent on the life process, but follow laws of the inorganic chemistry, has a large display of the apparatus he used to grind the yeast with infusorial earth, he then expressed the juice with hydraulic power, thus obtaining a fluid containing the enzyme and no cells. The juice so expressed and shown is of a brownish red color; when dried it resembles yellow dextrin; the pure product obtained by precipitating with alcohol-ether is pure white.

At the main entrance to the exhibit is a large room devoted to the current chemical literature of Germany, such as *Chemiker Zeitung*, *Pharmaceutische Centralhalle*, etc. Also many works illustrating the advances made during the past 500 years in the chemical arts in the Fatherland. On the left is the office of Dr. Zwingenberger, who was a director of the extended electrochemical plant of Von Heyden, a firm well known to all pharmacists; the Germans did well in having a chemical representative in charge of the exhibit. Next to the office is the weird laboratory of the alchemist mentioned in our first report. Opposite, the small 15 x 20-foot exact duplicate of Liebig's Laboratory at Giessen—a room that to-day would hardly do for the assistant to a professor in one of the great State laboratories. Still Liebig did all that marvelous work on the radicals of organic chemistry in this small laboratory.

Taught the greatest chemists of the world in that small room, left the analysis of organic compounds by combustion so perfect that he said every fool can now do this work; at least this is the sense of his expression, as we would say it in Missouri. Going now to the

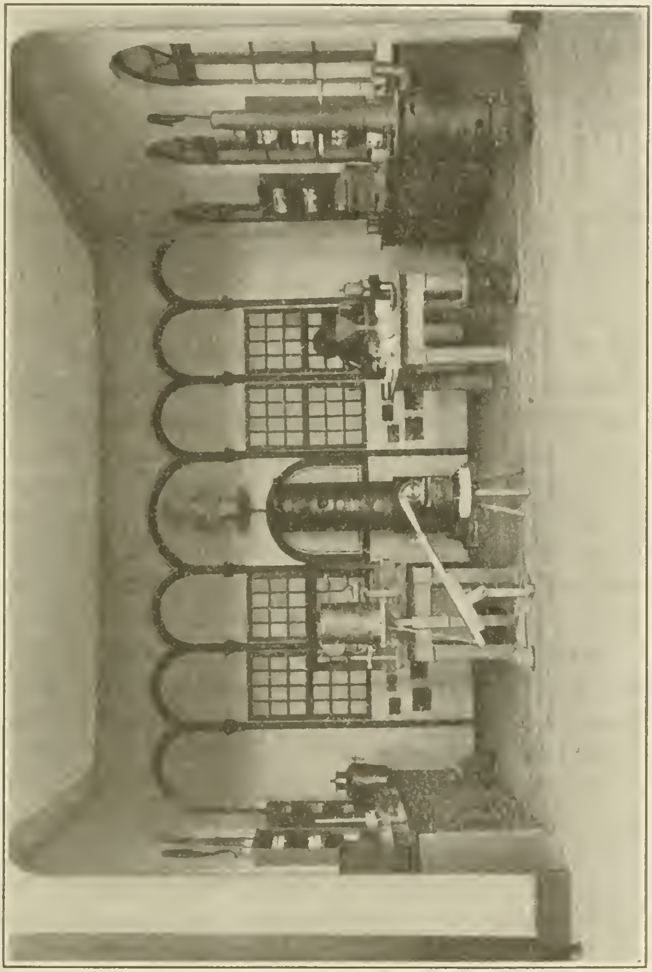


Alchemist's Laboratory.

Agriculture palace, we find the agricultural practice so lucidly portrayed by Liebig strongly exemplified in the display of Stassfurt salts.

In more ways than one it is a remarkable story that the Stass-

furt salt industry tells us, as may be read from the most excellent work on this industry by Dr. G. Krause.[1] Already in the days of the great Charlemagne, the region about the town of Stassfurt was



Liebig's Laboratory.

noted for its salt springs. Salt, common salt, was obtained from these waters by boiling down to crystallization. So important did this industry become in time that the landed owners and salt

[1] "Die Industrie von Stassfurt und Leopoldshall." Cöthen, 1877. The author is the founder of the greatest chemical paper of the world: *Chemiker Zeitung.*

boilers became nobles, always represented in the councils of state by one or more of their members. In those early and troublous times, the neighboring states could often use a little ready cash; now the people of the many always need the necessities of life; consequently, when tax measures are levied against the poor a golden stream flows into the coffers of the state. Accordingly, these states raised the duty on salt in many instances to an exorbitant degree, and, in turn, our industry flourished or languished.

That our salt boilers manufactured salt to some extent may be inferred from the fact that in 1776 the annual production amounted to 14,000,000 pounds. The times changed; the industry was sold to the Prussian crown for $75,000 in 1794. It proved a poor investment; 1815 witnessed no salt produced.

Science stepped in. Geologists began to reason that where salt springs of such extent continually flow from the earth, a very extended deposit of salt must exist in the immediate neighborhood. To prospect, borings were made in the thirties; in 1839 a strong flow of brine was struck. Remarkable result; it was unlike the pure, strong salt brine of the springs; it contained mainly magnesium chloride, was intensely bitter, while of salt a few per cent. was all that it could boast of.

In 1851 von Carnall supervised these works of the Prussian Government. Shafts were sunk down to the salt body. The deposit was found to be most extensive. In studying the deposit he found it to be composed of alternate layers of rock salt and anhydrite, conclusively showing that a periodical separation of the ocean's salts took place in these inland bays in prehistoric times. The influx of sea water did not dissolve the salt deposited by last year's flow, for the insoluble anhydrite protected the salt already separated. Geologists from these annual rings estimate the age of this salt deposit at upwards of tens of thousands of years. When finally it came to pass that the ocean no longer flowed over the entry bar, the immensely strong solution of the very soluble salts of the ocean separated and formed a coating of potash and magnesium salts on the salt proper. This colored deposit was at first looked upon as worthless; they were the *abraum-salze*, salts that must be removed to get at the valuable rock-salt.

It was not for long that these worthless colored salts were looked upon with anything but disgust. When a nuisance confronts the

miner he usually wants to know what it is; chemists showed the presence of much potassium in the abraum-salze. An immediate result was the building of many chemical factories about Stassfurt to utilize the seemingly worthless; indeed, this has proved the basis of much of Germany's boasted superiority as a center of chemical manufacture.

It was not alone the chemical industry that profited; what Washington called "the noblest calling of man," agriculture, profited more. With the modern intensive farming, the soil becomes impoverished; but the remarkable fact is that the United States Government has produced a bulletin the past year that knocks Liebig's teaching higher than a kite. As usual even the most radical statements of Liebig, denied by his most noted fellow-workers, are proved by time to be true. The necessity of potash in available form in the earth is not to-day denied. The discussion of the remarkable somersault of our Government chemist brought forth a lively discussion at the last December meeting of the Association for the Advancement of Science in St. Louis. No one went away with a feeling that the method of analysis of the Government chemist proved what he claimed. Liebig was right. Wheat requires potash; soils where none is found cannot produce a bumper crop. "*Ex nihilo nihil*," saith the alchemist, and Germany is not ashamed of him.

Coming back to kali, the German Government experiment stations show the marvelous effect of this fertilizer on various crops. One goes away with a feeling that chemistry is a noble science to enable us to bring forth more of the riches of the earth, to make two blades of grass grow where only one grew before. Examining the Kali Works exhibit, we see the cause—great blocks of colored salts showing all the formations of the region where they are obtained. In smaller glasses some exquisite samples of the many chemical individuals that have contributed so richly to modern chemical prowess of Imperial Germany.

Let us now pass to the uncivilized dependencies of Germany.

When the fever of colonial aggrandizement passed over the European powers, Germany was not backward in taking many valuable slices of the Dark Continent. All have an exit to the sea; the lands are under the broiling tropical sun. At present the outgo is greater than the revenue derived from these small empires. In the near future, when they make the negroes work, a different story

will be told. That these lands furnish some of the most desirable of tropical produce is finely demonstrated by the magnificent botanical display in the Palace of Education. In fact, it may be said that this is the "only" exhibit in this line on the grounds.

Togo lies next to that unruly negro kingdom of Ashanti. Their staff of life is furnished by the seeds of the various varieties of *Andropogon sorghum L.*, a plant favoring tropical climes, growing to a height of from 8 to 20 feet. The seed shown are from three varieties—about the size of a millet grain, of pure white color, of a rich orange and a fine cacao-red. These plants also grow in Ost-Africa, where the aborigines, not to be outdone by their Teuton masters, have for centuries brewed a beer, *merissa*, from these grains.

Cola acuminata is not so rich in caffein and theobromin as is the *Cola vera*. The brownish seed of both are found in a five-capsuled fruit, cacao-like, some 3 inches long by 1 inch in diameter. This cola is used largely in making liquors and medicinal tonics. In the neighboring Soudan it forms the drink. Chewed by the traveling natives, it sustains them on the often long and forced marches the couriers must make in those countries.

Butyrospermum Parkii yields a nut that much resembles a buckeye in size and form. The eye is white and more elliptical in shape; the body color is a fine pale brown. These seeds boiled with water yield the so-called shea butter, a bland fat of pale-green color that does not turn rancid.

At least six varieties of strophanthus are shown. Togo grows two—the *S. hispidus* and *S. sarmentosus*. The seed-pods and seeds of all are markedly different in size, shape and color. The twin-pods at almost right angles terminate a twig. Some are plump and a foot in length, others nearly 20 inches. The *S. hispidus* pod shown is about 18 inches long, at the base about ¾ inch in diameter, slowly tapering to a sharp point. The husk is of a darkish-brown tint, splotched with white spots. The seeds are of fine deep uniform brown, more sharply lenticular and rounded body than the others. The *S. sarmentosus* has fleshy, 12-inch long pod of uniform pale-brown color. The seeds are of a very pale gray-brown color.

The 3-foot blades of *Sansevieria guinensis* form the fiber plant. The long white fibers are heavy, and are excellent for making the strong ropes needed on shipboard.

Papuan or Guinea nutmegs from the *Argentea myristica* are about an inch in length, wrinkled and not plump. The *Myristica pseudar-*

gentea is about half the size. Both yield nutmegs of weak odor; the mace is more scraggy and thin; likewise of poor quality.

Kamerun lies to the north of the Congo Free State. A sickly gray cheese of *dika* bread forms their staple bread fruit, and is made largely from the *Irvingia gabunensis.*

Strophanthus Tholloni is shown as a dark-brown fleshy pod a foot in length. The seeds are very much flattened. The natives make a monkey-relish, with these seeds as an important addition; the poor apes, a terrible pest in that country, monkey no more after eating a small amount of the prepared meal. The *Strophanthus gratus* reminds one much of a fat, bulging milkweed-pod; it is smooth and of a pale-brown tint. This is much used to prepare an arrow poison.

Kamerun copal in white tears of clear resin down to the unwashed brown chunks are shown. The species yielding this fossil has as yet not been determined.

Ceylon cinnamon quills, cardamoms and many spices grow in this country to perfection.

The entry port for German Ost-Afrika is the British dependency, the isle and city of Zanzibar. Zanzibar copal (gum animé) is of excellent quality; the various grades are shown in good samples; this copal is obtained from *Trachylobium verrucosum.*

Strophanthus Eminii Pax et Aschers comes in light-gray pods about a foot in length. *Strophanthus grandiflorus* furnishes very hairy seeds, broader and of paler tint than the *S. hispidus.* In looking through the glass cases, it seems to us that the *S. hispidus* distinguishes itself from all the other seeds of these varieties by being of uniform length, about ¾ inch long, of smooth rounded body and of uniform deep-brown tint. The more highly considered *S. Kombé* is not shown in these collections.

On trees a very coarse thread-like lichen grows; this has a somewhat grayish tint when dried. This is the *Orcella montagnei* exported from Zanzibar in quite large quantities to Europe, where it is worked up for a kind of litmus dye.

In concluding, it might be well to say that the Germans have not spared expense to make all their exhibits presentable; elegant showcases are as essential at world shows as in sample-rooms and drug shops; the general impression will stick in the mind long after the exhibits of high intrinsic and educational value are forgotten.

THE COPPER TREATMENT OF WATER.

By Henry Kraemer.

The purification of water supplies containing pathogenic organisms being a subject of such vital importance, it seems to the writer that any method proposed for this purpose should receive careful consideration, not only at the hands of water engineers, health officials and physicians, but by all those who are in a position to test it, or to contribute information regarding it, or to foster a sentiment in favor of it, if found to be efficient. It was in this spirit that the writer undertook to carry on experiments for testing the efficiency of copper in reducing the number of micro-organisms in drinking water. The experiments were conducted in the microscopical laboratory of the Philadelphia College of Pharmacy, and I am indebted to Mr. John R. Rippetoe for assistance in the work. Before going further it should be stated that this communication is intended as a preliminary one.

During the years from 1876 to 1883 Prof. W. G. Farlow, of Harvard University, contributed some very interesting reports on the peculiar condition of the water supplied to the city of Boston, and showed in a paper published in *Science* (1883) the relations of certain forms of algæ to the disagreeable tastes and odors of some water supplies. It was, therefore, quite natural that Dr. George T. Moore, who was a student of Professor Farlow, and who has become so closely identified with this subject, should have become interested in it.

One of the earliest papers published by Dr. Moore along this line appeared in the American Journal of Pharmacy (January, 1900, p. 25), this being while he was still engaged in teaching at Dartmouth College.

In the Year-book of the U. S. Department of Agriculture for 1902 there is a paper by Dr. Moore, pathologist and algologist, in charge of the Laboratory of Plant Physiology, on "The Contamination of Public Water Supplies by Algæ," in which it is stated that some new experiments were inaugurated in the Department which promised to furnish another method of combating pollution in water caused by algæ. It is also stated that the experiments were successful in exterminating spirogyra in water-cress beds where it had done considerable damage.

The method used, however, was not published at that time; but after several years' experimenting it was given for the first time in a Bulletin of the Bureau of Plant Industry, published on May 7th of this year, an abstract of which appeared in the August number of this JOURNAL.

I think it can be said that at the present time there is not a doubt in the minds of engineers and others that the copper method proposed by Dr. Moore and Mr. Kellerman in this Bulletin is the only efficient one for removing algæ from water in reservoirs and in streams, and that this can be done without affecting the higher plants, as water-cress; or animal life, as fish, and so on.

While various explanations might be offered to show why such extremely minute quantities of copper sulphate as 1 part to 1,000,000 or even 50,000,000 parts of water is sufficient to kill the unicellular and filamentous algæ, and yet not affect multicellular plants, whose cells are as delicate in structure as those of the algæ, it seems to me that this is in a measure due to the fact that in the algæ the entire individual is comprised in a single cell, which performs all the vegetative as well as reproductive functions, and being entirely surrounded by the water containing the copper sulphate, all the life processes of the plant are affected, there being no way for it to distribute the solution to other cells, and thus by a dilution minimize the toxic action of the copper. Or if some of the cells in the multicellular plant are destroyed or injured by exposure to the solution, others are formed to take their place from the more or less deep-seated meristematic cells. It is true that the idiosyncrasies in these organisms should also be borne in mind, some of them being more resistant than others.

If the explanation be a valid one, it is reasonable to suppose that this principle of action would apply to other unicellular organisms, as the bacteria; and, indeed, Dr. Moore has shown that a solution of copper sulphate, 1 part to 100,000, is sufficient to destroy typhoid and cholera organisms in from three to four hours.

It was to be expected that the proposal of a method for the purification of water supplies, involving the use of copper sulphate, would arouse considerable discussion. In the first place, the question would arise as to the poisonous effects of the copper on man. Secondly, a question would arise to capitalists and others, who are investing large sums of money in filtration plants, as to whether

their investments and their labor extending over some years might not be entirely lost by the introduction of this comparatively simple and inexpensive mode of water purification.

The question of the danger from the use of copper sulphate in the manner set forth, has been shown by Dr. Moore to be practically without foundation, it being consumed in much larger quantities in certain foods at a single meal than would be obtained from a much larger quantity of water than would be consumed in a single day.

It may not be amiss to refer to Cushny's "Pharmacology and Therapeutics" in this connection, the work having been published in 1899, and the statements showing the peculiar behavior of copper being prophetic in a measure. He states that while it is comparatively harmless to man, yet it is exceedingly toxic to micro-organisms and intestinal parasites. Cushny says:

"Small quantities of copper may be taken for indefinite periods without any symptoms being induced, so that so far as man is concerned the general action of copper is unknown. . . . . On the other hand, copper is a deadly poison to several of the lower plants. Thus, traces of copper added to the water in which they live, destroy some of the simpler algæ, and Naegeli asserts that 1 part of copper in 1,000,000,000 parts of water is sufficient to kill these plants. . . . . Locke found that the traces of copper contained in water distilled in copper vessels were sufficient to destroy tubifex (one of the annelid worms) and tadpoles, while Bucholtz states that the development of bacteria is stopped by a solution of copper sulphate under 1 per cent. in strength. Copper thus seems to have a very powerful poisonous action on certain living forms and to be harmless to others, and the subject deserves further investigation. It is possible that it may prove to act prejudicially to some human parasites, and it is certainly less dangerous to man than many other remedies used as parasiticides and disinfectants."

The influence of the copper method in retarding the establishment of filtration plants would scarcely be any, it being proposed, as clearly stated by Dr. Moore, to apply this method to the purification of water containing pathogenic organisms, only as an emergency proceeding or as a supplementary measure, as when there are leaks in the filter or the filter is inefficient for any other reason, or when there is no filtration system. Notwithstanding the copper sulphate treatment, filtration would still be necessary for the removal of the excess of suspended matter from water supplies. While it is true that there are chemical methods of sedimentation, nothing practicable on a large scale has as yet been suggested.

In testing the value of copper sulphate for reducing the number

of micro-organisms in water, we used solutions having respectively the strengths of 1 part of copper sulphate to 100,000 parts of water, and of 1 part of copper sulphate to 1,000,000 parts of water; tap water was used after it was allowed to run about five minutes, and the solution was kept at room temperature for forty-eight hours. In this time there was a reduction of the total number of organisms in the first instance of 99 per cent. and in the second of 90 per cent.

The experiments which we are conducting are in the main, however, with colloidal copper, the reasons for which need not be stated. For this work my original intention was to use copper vessels; but finding that I would have to wait some time to have these made, those on the market being tin-lined, I decided to use strips of copper foil instead. The ordinary methods for the bacteriological examination of water were followed, Heyden's nutrient agar being used so as to obtain the growth of the maximum number of organisms. The mode of preparing this medium and its advantages are described by Dr. Robin in the March number of this JOURNAL. Ordinary sheet copper in thin pieces was used, these being about 15 centimeters square for each 1,000 c.c. of water, and being cleaned each time with a little powdered pumice. In some of the earlier experiments ordinary tap water was used (as much as 2,000 c.c. being experimented with), and it was found that from 85 to 97 per cent. of all the organisms were destroyed. In these experiments, as in those above mentioned, it is understood that if any typhoid and colon organisms were present, they would have been among the first to be destroyed.

The systematic study of the organisms which persist as well as those which were killed, is being continued, and will be reported on later. In order to satisfy myself that both colon and typhoid organisms are completely destroyed by the presence of copper foil, another series of experiments was made, using pure cultures of typhoid and of colon bacilli, which were allowed to develop from eighteen to twenty four hours in bouillon. Two 3-millimeter loops were added to 200 c.c. of water under three different conditions, control experiments being conducted at the same time. These were as follows: (1) Filtered tap water, which, after treatment with potassium permanganate, was distilled two or three times, the apparatus being constructed entirely of glass; (2) tap water which was filtered; and (3) ordinary tap water. All three were sterilized in an auto-

clave at 110 degrees for thirty minutes. After adding the cultures the water was kept at a temperature of 35° to 37° C., and plates were made at the end of four, eight, twenty-four and forty-eight hours, respectively. The plates were maintained at the same temperature and the organisms counted at the end of two days in the case of *B. coli* and of five days in the case of *B. typhosus*. The results are given in the following tables:

TABLE I.—EXPERIMENTS WITH *Bacillus coli.*

	Water *without* Copper Foil.			Water *with* Copper Foil.		
	Triple Distilled Water.	Filtered Tap Water.	Tap Water.	Triple Distilled Water.	Filtered Water.	Tap Water.
Plates made at time of adding culture	7,746	11,246	8,283	8,866	4,410	6,790
Plates made at end of four hours	7,655	5,075	7,665	No Organisms	No Organisms	No Organisms
Plates made at end of eight hours	7,735	3,115	7,000	"	"	"
Plates made at end of twenty-four hours	1,000,000	1,000,000	1,500,000	"	"	"
Plates made at end of forty-eight hours	1,200,000	1,600,000	2,000,000	"	"	"

TABLE II.—EXPERIMENTS WITH *Bacillus typhosus.*

	Water *without* Copper Foil.		Water *with* Copper Foil.		
	Triple Distilled Water.	Tap Water.	Triple Distilled Water.	Filtered Water.	Tap Water.
Plates made at time of adding culture	3,740	3,675	3,986	127	1,400
Plates made at end of four hours	2,835	3,815	No Organisms	No Organisms	No Organisms
Plates made at end of eight hours	3,850	1,995	" "	" "	" "
Plates made at end of twenty-four hours	3,750	1,435	" "	" "	" "
Plates made at end of forty-eight hours	3,815	1,540	" "	" "	" "

From the experiments thus far conducted the following conclusions may be drawn:

(1) The intestinal bacteria, like colon and typhoid, are completely destroyed by placing clear copper foil in the water containing them.

(2) The effects of colloidal copper and copper sulphate in the

purification of drinking water are in a quantitative sense much like filtration, only the organisms are completely destroyed.

(3) Pending the introduction of the copper treatment of water on a large scale the householder may avail himself of a method for the purification of drinking water by the use of strips of copper foil about 3½ inches square to each quart of water, this being allowed to stand over night, or from six to eight hours, at the ordinary temperature, and then drawn off or the copper removed.

CORRESPONDENCE.

THE PURIFICATION OF WATER BY MEANS OF COPPER.

The toxic influence of even very minute quantities of colloidal copper and of copper sulphate on certain micro-organisms having been pretty well established (see pp. 553, 574), the only other question of importance that arises in connection with their use for the purification of water supplies containing pathogenic organisms and algæ, is the one as to their effects on man. Inasmuch as this phase of the question is dependent upon physicians and pharmacologists for its elucidation, the editor of this JOURNAL has asked several members of the medical profession to discuss it.

It is to the credit of the medical profession that while some of those asked to contribute to this discussion have more or less positive convictions on the subject, others have been frank to say that their observations and experience in this line of investigation have not been sufficient to warrant them in giving an opinion at this time. One pharmacologist writes: "As I understand the purification method, the quantities of copper remaining in solution are so extremely small that they would scarcely be harmful."

Another eminent pharmacologist writes that when he was consulted by a city official to give an opinion as to whether one part of copper in 1,000,000 parts of water would be harmful, he replied that "assuming for purposes of argument that the copper remains in solution, and is not deposited or rendered insoluble, this small quantity could not be harmful to our citizens, even if they drank such water for a few days, since our ordinary food, as bread, meat, etc., all contain from two to three parts in the million. Some tissues, like the liver, contain as high as thirty parts in the million."

Up to the time of going to press replies were also received from Dr. Hare, Professor of Materia Medica and Therapeutics in the Jefferson Medical College, and from Dr. Holland, Dean and Professor of Medical Chemistry and Toxicology in Jefferson Medical College. Their replies are as follows:

My Dear Professor Kraemer:

In reply to your note let me state that small doses of copper exercise, so far as is known, a stimulant effect upon nutritional processes. I do not think that we have any information in regard to the infinitesimal quantities which are present in water when treated by the copper method, but it is incredible that they could exercise any deleterious influence. Certainly the improbable deleterious influence of infinitesimal quantities of copper when compared to the certain evil influence of micro-organisms amounts to nothing.

Very truly yours, H. A. HARE.

PHILADELPHIA, November 14, 1904.

Mr. Henry Kraemer, Editor of AMERICAN JOURNAL OF PHARMACY.

DEAR SIR:—In his paper on purification of water by copper I think that Dr. Moore shows conclusively that water supplies can be freed of pathogenic bacteria and algæ promptly, cheaply and efficiently by that means. The question remaining to be answered is, can this purification be done with entire safety to those drinking the water?

Until comparatively recent times it has been thought that the slow introduction of minute doses of copper was injurious to the tissues by causing such pathological changes as are known to be due to certain other metallic poisons, such as lead, arsenic and mercury. But Bernatzic[1] has proven that to produce toxic phenomena with copper salts it must be given freely and intentionally, and even then the subject spontaneously recovers when the administration ceases. When a student of medicine I was made aware of the harmlessness of copper sulphate in small doses. Quinine was very expensive then, and in the dispensary practice of a malarious region some cheaper substitute was needed. Hundreds of cases were treated with a combination of the sulphates of cinchonine, iron and copper. About 1/8 of a grain of sulphate of copper was given

[1] Encyc. d. ges. Heilkunde.

several times daily in this routine prescription for a tonic and anti-periodic.

I do not remember that any untoward symptoms developed, though they were not unexpected, as the books then taught that copper salts were irritants. So they are, but only in doses much larger than 1/8 of a grain. We saw no cumulative effects. Lehmann[1] and his pupils found that a man could take 1 to 2 grains of copper as sulphate and acetate daily in peas and beans divided into two meals without effect.

The highest sanitary authorities[2] appointed to investigate this matter have reported that "copper in the amounts found in canned goods is not capable of injury to health."

Metallic copper is not a poison. Surgeons have used copper wire for suturing wounds without noticing local irritation; children swallow copper pennies daily without injury to the digestive tract. As copper is present in almost all our food, it is not surprising to learn that each of us takes daily about 1 milligram of copper,[3] and that it is found regularly in our tissues. I see no reason to fear copper if the amounts never exceed the small proportion stated by Dr. Moore as entirely adequate for the purification of water supplies.

J. W. HOLLAND.

PHILADELPHIA, November 15, 1904.

PROGRESS IN PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE RECENT LITERATURE RELATING TO PHARMACY AND MATERIA MEDICA.

By M. I. WILBERT,
Apothecary at the German Hospital, Philadelphia.

The closing year has been one of exceptional importance to the progress of pharmacy, along professional lines. Among the more interesting events that must contribute to this advance, we may enumerate: the enactment of the pre-requisite law by the State of New York; the union of the College of Pharmacy of the City of New York with Columbia University; the union of the

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[1] *Münch. Med. Wochenschr.*, 1891.

[2] Pasteur, Poggiale and Brouardel in *Annals d'Hyg.*, 1880.

[3] Blyth: "Poisons—Effects and Detection."

Maryland College of Pharmacy with the University of Maryland; the inauguration of an Association of State Boards of Pharmacy, at the recent meeting of the A.Ph.A. at Kansas City; the admission of pharmacists as members of the Section of Pharmacology of the American Medical Association. In addition to these several important events, there is also to be noted a continued increase in the feeling of mutual respect and regard, among members of the profession or calling, that is so essential to the making of any degree of progress in a professional way. Strange as it may seem, this particular feeling of mutual regard has been developed most successfully in connection with recent efforts to improve commercial conditions, and was particularly evident at the *sixth annual meeting of the National Association of Retail Druggists*, held in St. Louis, Mo., from October 10th to 14th, inclusive. This convention is said to have been the largest national gathering of retail pharmacists ever held in this country.

While the business meetings of this association were confined entirely to the consideration of commercial problems, the meeting of the various members, in a social way, coupled with the very unique educational features of the Louisiana Purchase Exposition, must necessarily have been of additional advantage to the pharmacists who were fortunate enough to be able to attend.

Of the Louisiana Purchase Exposition as an educational feature, it will not be necessary to do more than call attention again to the series of interesting descriptive articles that have appeared in this JOURNAL during the past months.

Among the more interesting happenings in the domain of abstract science the most important, probably, is the more general acceptance of what is usually referred to as *The New Theory of Matter*. One of the more popular expositions of this new theory was given by the Right Hon. A. J. Balfour, the Prime Minister of Great Britain, in his address, as president, before the British Association for the Advancement of Science. (PHAR. JOUR., August, 1904, page 297.) He says: "To-day there are those who regard gross matter, the matter of everyday experience, as the mere appearance of which electricity is the physical basis, who think that the elementary atom of the chemist, itself far beyond the limits of direct perception, is but a connected system of monads or subatoms which are not electrified matter, but electricity itself; that these systems

differ in the number of monad which they contain, in their arrangement and in their motion relative to each other and to the ether. That on these differences, and on these differences alone, depend the various qualities of what have hitherto been regarded as indivisible and elementary atoms; and that while in most cases these atomic systems may maintain their equilibrium for periods which, compared with such astronomical processes as the cooling of the sun may seem almost eternal, they are not less obedient to the law of change than the everlasting heavens themselves."

The more general acceptance of this new theory of matter, whether it prove to be true or false, marks a distinct step forward into the realms of the unknown that will, in the very near future, result in practical explanations of many of the hitherto unsatisfactorily explained physical phenomena.

The Unification of Potent Medicaments.—According to a recently published report (*Schweiz. Woch. f. Chem. u. Phar.*, 1904, page 539), the following governments have adopted the recommendations of the International Conference at Brussels, held 1902, without reserve: Belgium, Bulgaria, Denmark, France, Greece, Holland, Hungary, Italy, Norway, Portugal, Roumania, Russia, Spain, and Switzerland. The following have adopted the recommendations, with slight, but unimportant, provisions: Austria, Sweden and Great Britain.

The German Empire, whose representatives, it will be remembered, were not authorized to sign the protocol, has but recently (1900) published a revision of its pharmacopœia, and does not think the necessary changes of sufficient general importance to be introduced at this time, but has signified its willingness to adopt them in detail at its next revision.

In the United States the Pharmacopœia is revised by an independent committee of revision, not in any way connected with the government. This committee has not, so far as known, signified its intentions regarding the proposed unification of potent medicaments.

Swiss Pharmacopœia.—At a recent session of the Swiss Pharmacopœia Revision Commission several important general principles were finally adopted. After considerable discussion it was adopted to use the so-called practical (O–16) standard table of atomic weights in preference to the hydrogen standard.

The recommendations of the Brussels Convention for the unification of potent remedies were unanimously adopted.

To obviate any possible conflict with manufacturers or owners of patents on synthetic chemicals, it was proposed to omit the publication of trade names of patented or registered preparations as synonyms, but to include instead the following phrase: "The above described substance is chemically identical with that known as ——." It was also agreed to retain the names of authors of plant species; to designate the allowable ash of organic drugs, and to give the solubility of chemicals in as nearly as possible exact figures.

The seventy-sixth annual meeting of the German Naturalists and Physicians was held in Breslau from the 18th to 24th of September, and was, as usual, well attended. The meetings of the section on Pharmacy and Pharmacognosy were held in the hall of the Pharmaceutical Institute, and were presided over by Professor Gademer, the present director of the Institute.

Among the papers presented was one on "Matico Oil and Matico Camphor," by Professor Thoms, of Steglitz, who reported on the examination of a sample of matico oil that had been distilled from genuine matico leaves derived from Piper Angustifolium Ruiz et Pav. This oil on standing separated out a mass of crystals that on closer examination proved to be identical with asaron, the total was estimated as being in the neighborhood of 10 per cent. Former samples of oil of matico that had been examined contained apiol; this did not. Other physical characteristics of the oil were also quite different in this particular specimen. (*Süd. Deut. Apoth. Zeit'g*, 1904, page 678.)

German Opium.—Professor Thoms, in another paper, reviewed the experiments that had been made to produce opium in Germany, and then gave some interesting details of an experiment that he had conducted during the past summer. From white-seed poppy he was able to obtain an average of 1·27 grams of air-dry opium from 100 poppy heads; this opium was found to contain 6·6 per cent. of morphine corresponding very closely to what Biltz had found in 1829 (6·85 per cent.). From these figures it would require 80,000 poppy heads, or the double scarification of 40,000, for 1 kilo of opium. (*Phar. Zeit.*, September, 1904, page 812.)

Tin Plague or Tin Disease.—Dr. Hamburger called attention to

the fact that at low temperatures pure tin has the property of being changed to a peculiar modification of the metal—a dull gray powder. This change may also take place at ordinary temperatures if the tin has been brought in contact, infected as it were, with some of this powder. (*Phar. Zeit.*, 1904, page 814.)

The German Association for the Abolition of Quackery held an exhibition in connection with the meeting of the German naturalists and physicians that was intended to demonstrate how widespread and general the illegal practice of medicine is even in paternal Germany. This exhibition demonstrated, primarily, how difficult it will be to abolish, or even to prevent, the spread of quackery among the general public. (*Phar. Zeit.*, 1904, page 828.)

The prevailing tendency to overvalue the new and strange at the expense of the old and tried was the subject of an address by Sir Dyce Duckworth before the British Medical Association, who particularly deprecates the reckless administration of new drugs in place of well-tried and generally recognized standard remedies. (*Jour. Am. Med. Assoc.*, 1904, page 268.)

Proposed Reform in the Nomenclature of Synthetic Chemicals.—Golaz-Vevey (*Schweiz. Woch. f. Chem. u. Phar.*, 1904, page 566) calls attention to the fact that pharmacists are frequently directed to dispense preparations about which they know absolutely nothing more than the fanciful name ending in al, en, ic, in or ol. These names usually consist of (1) some arbitrary abbreviation of the descriptive chemical title; (2) some real or imaginary reference to the possible therapeutic uses of the remedy; or (3) some fanciful and usually far-fetched discovery of the manufacturer.

To reduce, to some degree at least, the abuses that must necessarily arise, it is proposed that pharmaceutical and medical societies demand that manufacturers furnish information on (*a*) the commercial as well as the exact chemical constitution of the preparation; (*b*) reliable tests for identity; (*c*) melting and boiling points; (*d*) solubility; (*e*) special incompatibility; (*f*) dose and therapeutic action; (*g*) necessary precautions that are to be observed in keeping the preparation.

If this really necessary information were forthcoming in all cases, new preparations might be dispensed and used with some prospect of a more rational advance in therapeutics.

Pharmaceutical Nomenclature.—*American Medicine* (October, 1904,

page 698) in calling attention to the need of generally acceptable non-trade-marked names for new drugs, speaks of the confusion existing in connection with the active principle of the suprarenal gland. "In the case of this substance, indeed, we are badly off, as the most appropriate name, 'Epinephrin,' which was given by Abel to this substance before any one had either isolated it or obtained it in any reasonable degree of purity, would not be recognized by the pharmacist to whom a prescription would be taken as applying to any of the products placed at his disposal by manufacturers, for each house has its own name, and claims superiority for the substance or combination of substances it designates by this name. It is not only possible, but probable, that there may be differences in these products—some essential, some non-essential. If so, there is all the more reason why some disinterested scientific body should determine and make known wherein such differences consist, and their chemic, physiologic and therapeutic importance. If the physician is to use pharmaceutic products usefully and skilfully, he must have definite and exact information concerning them; he must be sure that his patient gets what he prescribes, and he must not be led astray by unfounded similarities or differences in the naming of the agents he uses."

Camphor production in the far-away island of Formosa is not without its attending risks and dangers. The *Chemist and Druggist* (September, 1904, page 433), quoting from a paper by Sir John Keane, in *Blackwood's Magazine* for August, says: "The trees are felled and the camphor distilled from them chiefly by the Hakkas, who are civilized natives. But living in those mountains are many tribes of irreconcilable aborigines, who resent and, to the best of their power, resist the advance of their uninvited civilizers. For centuries it has been the custom of these savages to adorn their homes with the heads of their enemies, and when they have fixed on a head they want, they will lie in wait for its owner for days until they catch him. The camphor workers, who live in isolated parties, are well armed, but in the district visited by Sir John Keane forty heads had been lost in the previous nine months."

Green Cardamoms are simply the ordinary cardamoms dried in the air instead of being stove dried and sulphur bleached, in the usual method. The principal virtue of the green cardamom is said to be that it is much sweeter and stronger in flavor than the bleached

quality; while the prices at present are higher, the cost of production is less. The use to which green cardamoms are ultimately put is still more or less shrouded in mystery; but it appears that the demand for this variety was first created by the discovery made by the German sausage makers, who found that the better and stronger flavoring was got from the less finished article. (*Chem. and Drug.*, September, 1904, page 444.)

Nux Vomica.—The *Chemist and Druggist* (September, 1904, page 452) gives an abstract from an article published in the *Calcutta Capital* describing in detail the sources and methods of collecting this drug. Nux vomica is included among the general items of the minor forest products of India, and the right to collect is yearly sold to the highest bidder.

The nux vomica tree has an imposing appearance, bearing in the autumn clusters of greenish or yellow fruits, according to their maturity. The fruits are the size of an apple and contain a soft pulp, in which are embedded numerous round flattened seeds of a grayish-green color. The first quality of seed is obtained by collecting the fruits, washing out the seeds and drying them in the sun. The more inferior qualities of the drug usually consist of seeds gathered from under the trees, which have been rejected by the birds and monkeys, who eat freely of the pulp when ripe. Cochin enjoys a large trade in nux vomica, as the dry sub-mountainous tracts of the Travancore Hills afford seeds of good appearance and quality.

Rhubarb.—Prof. A. Tschirch, who has recently made an exhaustive comparative study of the different varieties of rhubarb, concludes that practically all of the known plants yielding rhubarb are to be classed in one or the other of three varieties, *Rheum Palmatum*, *Rheum Officinale* and *Rheum Collinianum.* From the fact that commercial Chinese rhubarb usually consists of a mixture of several varieties, some of which do not show any of the structural characteristics noted in the three varieties enumerated above, Tschirch concludes that much of it is derived from some still unknown plant. The chemical examination of the specimens grown in the botanical gardens at Berne, Switzerland, shows that there is considerable variation in the emodin content of the different varieties of rhubarb. Commercial Chinese rhubarb contains as high as 4 per cent. of emodin, while the best of that grown at Berne, derived from rheum

palmatum, gave but 2·8 per cent., the drug obtained from Rheum officinale 2 per cent., and Rheum collinianum 1·8 per cent. It will readily be seen that Rheum palmatum is the only variety that at all approximates Chinese rhubarb in strength, and Tschirch therefore strongly recommends the raising of this variety alone for medicinal purposes. From a recent trade report by Cæsar and Loretz, Halle a. d. S., it appears that there are at least three distinct types of Chinese rhubarb:

(1) Shensi rhubarb; this occurs in full, flat or round pieces, having a bright red color, not fibrous, with a distinctive, mild and not disagreeable, odor and a slightly aromatic bitter taste. Shensi or shansi rhubarb is considered the more valuable variety, and always commands a much higher price than either of the others.

(2) Canton rhubarb; this usually consists of round or flattish round pieces that have a tough, fibrous and more sponge-like structure and pale red color. Canton rhubarb has a distinctly empyreumatic odor and a distinctly bitter and peculiarly astringent taste.

(3) Shanghai rhubarb; flat, usually thinner pieces, partially fibrous, tough and usually of a firmer and a denser structure, yellowish red color, more distinctly empyreumatic odor and a peculiarly disagreeable and persistently bitter mucilaginous taste. (*Süd. Deut. Apoth. Zeit.*, 1904, page 590.)

Refractive Index of Clove Oil.—W. H. Simmons believes that there can be no doubt that the refractive index of clove oil is an important and useful factor, indicating as it does the approximate content of eugenol. It is not safe to base an opinion on the refractive index alone, particularly in cases in which the genuineness of the sample cannot be guaranteed. (*Chem. News*, through PHAR. JOUR., 1904, page 450.)

Detection of Powdered Gum Acacia in Powdered Tragacanth.—E. Payet finds that tragacanth does not, like acacia, contain an active oxydase, which acts on guaiacol in aqueous solution, in the presence of hydrogen peroxide. He proposes to take advantage of this fact in the following test: If a 1–30 solution of the suspected gum in cold water is mixed with an equal volume of a 1 per cent. guiacol solution in water, and a drop of hydrogen peroxide added, the mixture, if acacia be present, will soon become brown, but if the tragacanth be pure, remain unchanged. (*Phar. Jour.*, 1904, page 453, from *Repertoire de Phar.*)

Presence of Formaldehyde in Smoke.—A. Trillat finds that formaldehyde is invariably present in the products of combustion and smoke of organic materials, such as wood, paper, cellulose and tobacco. In some cases as much as 1–1·000 of the material, even simple hydrocarbons, like benzol, toluene and xylene, give appreciable quantities. He concludes, therefore, that formaldehyde is a constant and normal constituent of the combustion products. (*Compt. Rend.*, through *Phar. Jour.*, September, 1904, page 378.)

Poisoning by Wood Alcohol.—Dr. Frank Buller, of Montreal, and Dr. Casey A. Wood, of Chicago, presented a lengthy report on the cases of death and blindness from wood alcohol, Columbian spirits and other methylated preparations before the section on ophthalmology at the meeting of the American Medical Association in Atlantic City last June. This report has been published (*Jour. Am. Med. Assoc.*, October 1, 8, 15, 22 and 28), and contains much that should be of interest to the pharmacist.

Among the commmercial forms of methyl alcohol the authors enumerate as crude productions: wood alcohol, wood spirit, pyroligneous spirit, wood naphtha and methylated spirits. Of the deodorized products, Columbian spirits, Colonial spirits, Union spirits, Eagle spirits, green wood spirits and standard wood spirits. These several products have been and are being recommended to be used for bathing, burning and cleaning. In all of these uses ample opportunity is afforded for absorption of the poison.

The authors conclude that methyl or wood alcohol in any of its forms is a dangerous poison, menacing both life and eyesight. To this date at least 153 cases of blindness and no less than 122 deaths have resulted from its use.

Almatein is a combination of hæmatoxylin with formaldehyde and is an odorless powder, soluble in alcohol and in glycerin. It is being recommended as a substitute for iodoform. (*Phar. Cent. Halle*, 1904, page 794.)

Cyclogalliphanic Acid is the name given by Kunz-Krause and Schelle to a new acid which they have isolated from gall-nuts. The acid crystallizes in prisms, and is insoluble in water, but soluble in most organic solvents. Its formula is $C_{21}H_{36}O_3$. It is non-basic, yields a mono-acetyl derivative and gives a blue precipitate with ferric chloride. (*Chem. and Drug.*, September, page 546.)

Digalen.—This is said to be a soluble digitoxin, obtained by a

complicated process, not given or described, from prime digitalis leaves. Digalen is a white amorphous substance chemically identified with crystalline digitoxin. The dose of digalen is from 0·003 to 0·012. (*Phar. Zeit.*, 1904, page 716.)

Eucaine Lactate occurs as a white non-hygroscopic powder, readily soluble in water and also in alcohol. The aqueous solution has a slightly alkaline reaction. It is recommended as a local anæsthetic, and is used in from 2 to 5 per cent. solutions for the eye and for dental practice, and in from 10 to 15 per cent. solutions for the nose and ear. For infiltration a 0·1 per cent. solution in 1 or 0·8 per cent. solution of sodium chloride is recommended. (*Phar. Zeit.*, September, 1904, page 684.)

Euporphin is a methyl bromide compound of apomorphine, and is being recommended as an improvement on the latter drug. Euporphin is readily soluble in water and in alcohol, but only slightly soluble in ether, chloroform, benzol or benzine. It occurs as white, or yellowish white, crystalline scales that are gradually changed to a brownish color under the influence of moisture, air and light. Maximum single dose, 0·02; maximum daily dose, 0·06. (*Apoth. Zeit*, September, 1904, page 720.)

Glycosal (mono-salicylic acid glycerin ester) is a white crystalline powder, melting at 76° C., and soluble in cold water to the extent of about 1 per cent. It is readily soluble in hot water or alcohol, less freely soluble in ether or chloroform and readily miscible with glycerin. Glycosal has been recommended for internal as well as external use as a substitute for salicylic acid in cases of rheumatism. It is given in doses of from 0·50 to 1·00 three or four times a day. (*Viertel Jahresschr. f. Prac. Phar.*, 1904, page 213.)

Isoform (p. Iod-anisol) is being recommended as an antiseptic and deodorant. P. iod-anisol is obtained by oxydizing iod-anisol, and occurs as silvery scales that are but slightly soluble in water. They are more soluble in hot water or in diluted acetic acid; insoluble in alcohol or in ether. At a temperature of 225 degrees isoform is decomposed with explosive violence. For various reasons it is being marketed only in mixtures with calcium phosphate or as a paste with glycerin. (*Phar. Zeit.*, 1904, page 842.)

Marsitriol (ferric glycero-arsenate), a yellow amorphous powder, said to be an efficient preparation of arsenic, is given in doses of from 0 05 to 0·20 per day. (*Rev. Ed. Phar*, 1904, page 849.)

Styracol (the cinnamic acid ester of guaiacol) is recommended on account of its being a comparatively non-toxic preparation of guaiacol. It is odorless and tasteless, and, in addition to its possible use in the treatment of tuberculosis, has been used in intestinal colic and summer diarrhoea. The dose is given as being 1·00 three or four times a day. (*Süd. Deut. Apoth. Zeit.*, 1904, page 626.)

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

A Compendium of Chemistry, including General, Inorganic and Organic Chemistry. By Dr. Carl Arnold, authorized translation from the eleventh German edition by John A. Mandel, Sc.D., Professor of Chemistry in the University and Bellevue Hospital Medical College. New York: John Wiley & Sons. 1904. Small 8vo, 627 pages. $3.25

This is the first American edition of the well-known "Repetitorium der Chemie" of Arnold, which has gone through numerous editions in Germany. The translator says: "The eleventh and last edition contains concise but clear statements of the most important theories and facts, especially in the recently developed domain of physical chemistry, as well as a classified review of the most important inorganic and organic compounds, including statements of the constitution and derivation of these substances."

In the division of the subject as given in the title, we find 95 pages taken up with general chemistry, 200 with inorganic chemistry, both non-metallic and metallic, and 277 with organic chemistry. While this relatively large proportion of space given to general or theoretical chemistry makes the book very satisfactory to an advanced chemical student for review or for the practising chemist as a compend to turn to, it prevents its use with the beginner, as the theory is all massed together at the outset before the descriptive part, some acquaintance with the experimental side of chemistry being needed for the proper understanding of this mass of theory. However, the theory is very well stated. After discussing under the heading "Stoichiometry," the subject of atoms, molecules, symbols, formulas, valence, and properties of elements, the author proceeds to take up, under the heading "Chemical Affinity," the subject of chemical mechanics (chemical dynamics and chemical statics), thermo-chemistry, electro-chemistry and photo-chemistry.

These are presented in accordance with the most modern views of physical chemistry, and give the reader an excellent idea of the great advances of this new branch of science. The classification of reactions according to the conditions of equilibrium indicated, and the application of the phase rule to determine the several systems is very clearly and intelligently stated; the ionic theory and its applications in the explanation of the phenomena of electrolysis is equally well stated, and some of its applications of importance for physiological chemistry indicated. Practical applications of these theories are also indicated, as in connection with the discussion of the electromotive series where the author explains "a knowledge of the electromotive series is of practical importance, since in all cases where objects of metal (alloys, combinations of metals in contact, metals with mechanically or galvanically prepared metallic coatings) are exposed to the action of the elements an opportunity is afforded for the formation of short circuited galvanic couples, as a result of which the metal with the highest solution tension dissolves, but the other remains intact. Galvanized iron is, therefore, not so strongly oxidized at points where the zinc covering has been injured as if it were not galvanized, while tinned iron on an injury to the tin coating oxidizes (rusts) more readily than it would if it were not tinned, because the iron has a greater solution tension than tin and a lower solution tension than zinc."

The portion devoted to inorganic chemistry is in the main well written, and in every way up-to-date in its statements, but it suffers in places from too great condensation, made necessary by the wide scope of the book. The analytical reactions are specially noted after each metal in a section on the detection of its compounds. The translator has made a blunder in the section on Iron (page 280), by translating the German steinkohlen by the word anthracite. In speaking of the blast furnace he says: "Anthracite cannot be used directly, but must first be converted into coke." It is needless to say that coke is made from bituminous coal and not from anthracite.

The classification and general treatment of the organic section is very satisfactory, and serves to give one an excellent survey of the field of organic compounds and the relationship existing there.

The book is provided with a very full index, and has an enormous amount of information compressed in its 627 pages.

S. P. Sadtler.

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TO VOLUME 76 OF THE AMERICAN JOURNAL OF PHARMACY.[1]

AUTHORS.

[1] Compiled by Florence Yaple.

SUBJECTS.

PHILADELPHIA COLLEGE OF PHARMACY :

REVIEWS :

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